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Final Environmental Impact Statement
Red Dog Mine Project, Northwest Alaska
Volume 2. Appendices

(U.S.) Environmental Protection Agency
Seattle, WA

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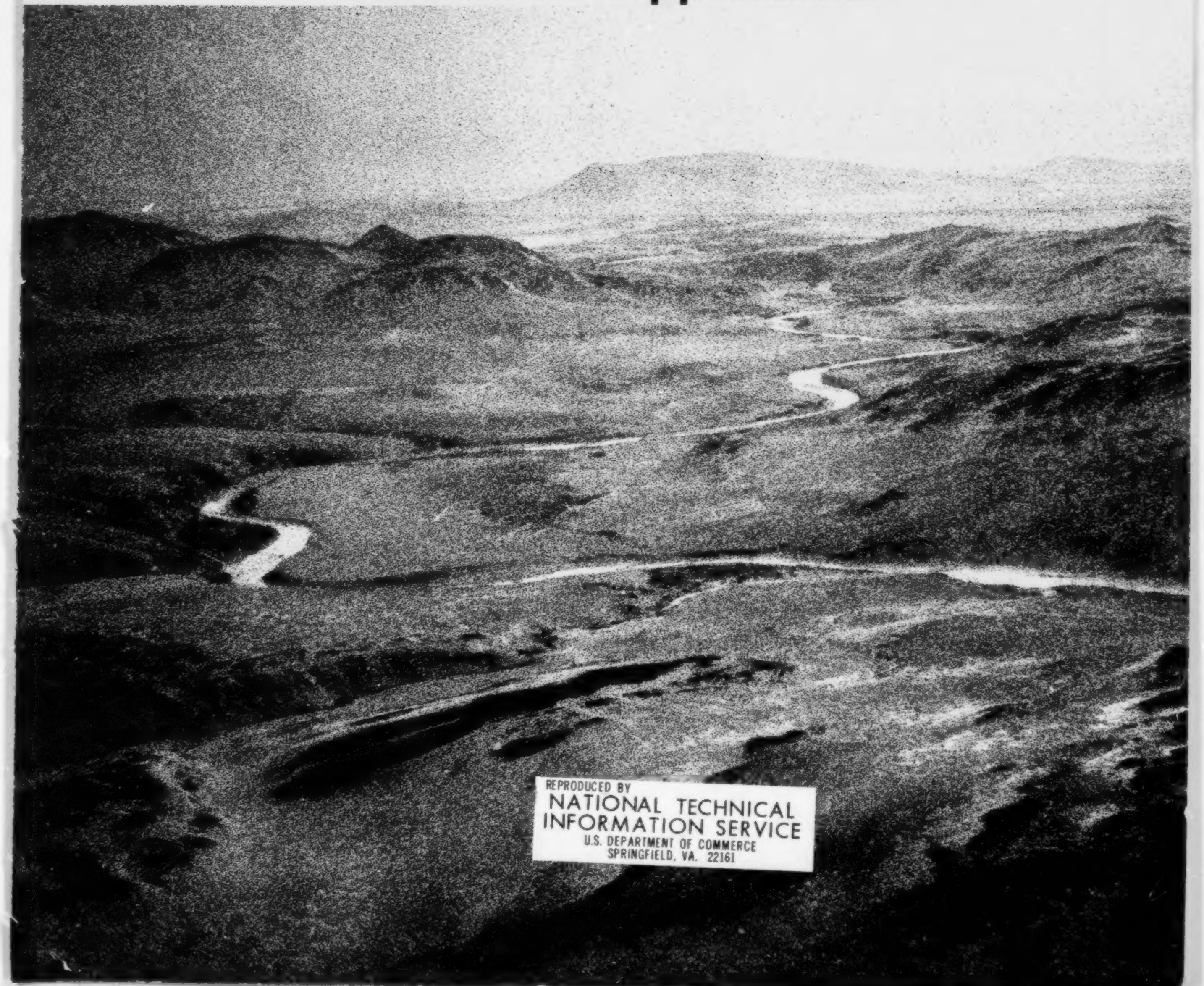
Volume II—Appendices



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RED DOG MINE PROJECT
FINAL ENVIRONMENTAL IMPACT
STATEMENT

Volume II: Appendices

1. Reclamation Plan
2. Spill, Prevention, Control and Countermeasure Plan
3. Endangered Species Biological Assessment
4. Proposed NPDES Permits
5. Department of the Army Public Notice and Section 404(b)(1) Evaluation
6. ANILCA Title XI Right-of-Way Application
7. Cultural Resources Protection
8. Coastal Zone Management Consistency

RECLAMATION PLAN
RED DOG PROJECT
JUNE 1983

PREPARED BY COMINCO ENGINEERING SERVICES LTD.

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1. Summary

Cominco Alaska Inc. is exploring the development of substantial deposits of lead/zinc/silver ore adjacent Red Dog Creek in NW Alaska, 90 air miles north of Kotzebue. The project will consist of an open pit mine and concentrator together with associated transportation and shipping facilities. The project has a potential life of 50 years. Development of the project according to preferred siting options will ultimately disturb 2,070 acres of land including 1,500 acres over the 50 year period at the mine site, 520 acres along the transportation corridor and 50 acres at the coastal shipping facility. In accordance with an agreement with the NANA Regional Corporation, Cominco Alaska will reclaim all land disturbed as a result of the operation.

A conceptual plan for the reclamation of land affected by various components of the Red Dog project is presented. The plan provides for the reclamation of all disturbed lands in accordance with guidelines established by the NANA-Cominco Alaska agreement. While it is recognized as desirable to initiate reclamation as early as possible following disturbance, the main project components of the mine site, the transportation corridor and the shipping facility will be active for the duration of the project life. Reclamation of these components must, therefore, be delayed until late in the operating life of the mine and following abandonment.

Due to the site specific nature of factors affecting revegetation potential of mined-land disturbances and to limited revegetation technology specific for conditions prevailing at the site, detailed plans for revegetating waste disposal sites are not presented in the conceptual plan. A research program will be implemented early in the operating period of the project to develop the technology necessary to achieve revegetation objectives.

A reclamation and post-production accrual fund to cover reclamation and all other post-production expenditures will be established. Cominco Alaska will maintain a performance bond underwriting the reclamation as required by the agreement with NANA.

2. Introduction

Cominco Alaska Inc. is exploring the development of substantial deposits of lead/zinc/silver ore adjacent Red Dog Creek near Deadlock Mountain in NW Alaska (Figure 2.1). The project will consist of an open pit mine and concentrator 90 air miles north of Kotzebue, together with associated transportation and shipping facilities.

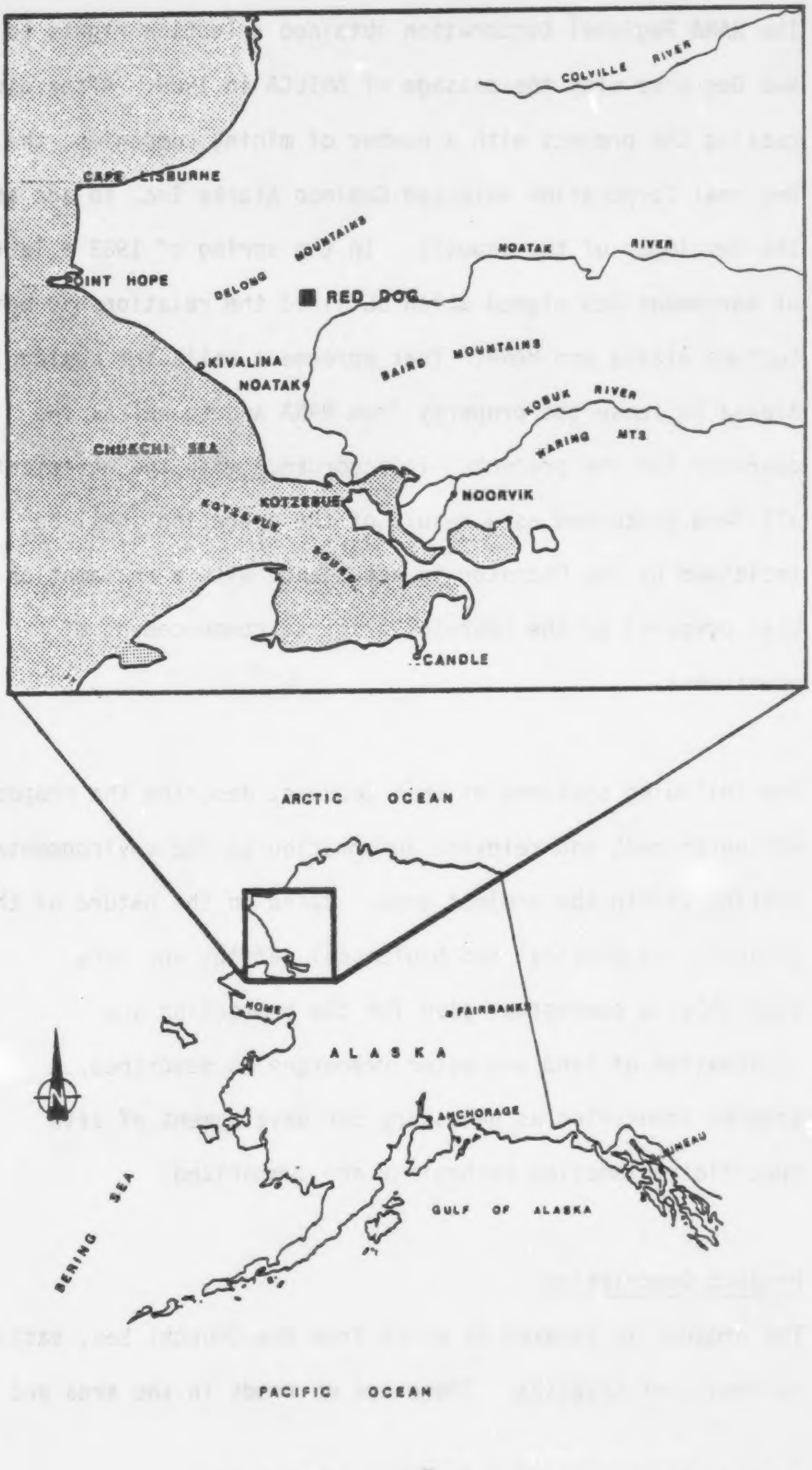

COLVILLE RIVER
CAPE LISBURNE
DELONG MOUNTAINS
NOATAK RIVER
POINT HOPE
RED DOG
BAIRD MOUNTAINS
KIVALINA
NOATAK
KOBUK RIVER
WARING MTS
CHUKCHI SEA
KOTZEBUE
NOORVIK
KOTZEBUE SOUND
CANDLE
ARCTIC OCEAN
NOME
FAIRBANKS
ALASKA
N
ANCHORAGE
JUNEAU
BERING SEA
GULF OF ALASKA
PACIFIC OCEAN

FIG 2.1 RED DOG LOCATION MAP

The NANA Regional Corporation obtained selection rights to the Red Dog area with the passage of ANILCA in 1980. After discussing the project with a number of mining companies, the Regional Corporation selected Cominco Alaska Inc. to act as the developer of the deposit. In the spring of 1982 a letter of agreement was signed which outlined the relationship between Cominco Alaska and NANA. That agreement calls for Cominco Alaska to lease the property from NANA and to act as the operator for the project. In accordance with the agreement, all land disturbed as a result of the operation shall be reclaimed by the Operator in accordance with a reclamation plan prepared by the Operator prior to commencement of operations.

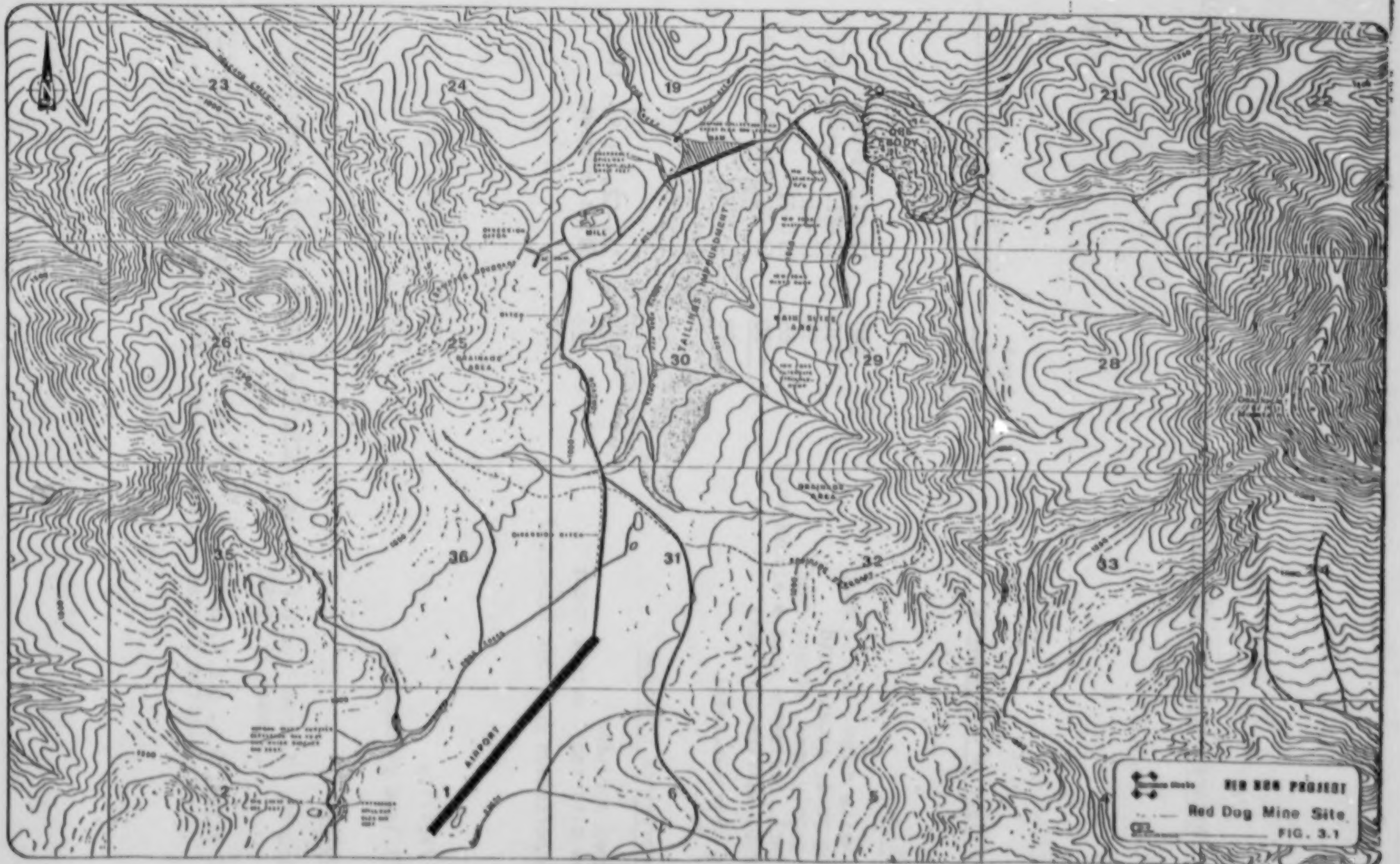
The following sections of this document describe the proposed mining project and relevant information on the environmental setting within the project area. Based on the nature of the project, its physical and biological setting and data available, a conceptual plan for the protection and reclamation of land and water resources is described. Studies identified as necessary for development of site specific reclamation technology are summarized.

3. Project Description

The project is located 55 miles from the Chukchi Sea, east-northeast of Kivalina. There are no roads in the area and the nearest village to the deposit is Noatak, some 47 miles to the south. The ore is in the form of metal sulphides in a Mississippian chert formation in the drainage area of two forks of Red Dog Creek. Although the deposit is not yet fully defined by geologists, the potential mine contains approximately 85 million tons of mineralization. The project will have a potential life of 50 years with the possibility of extension if new ore is found.

Development of the Red Dog mine will require establishment of the entire infrastructure necessary to mine the ore, concentrate the minerals and transport the concentrate to salt water for shipment. Mine site facilities will include the mine pit and waste dumps; a mill and tailings impoundment; a water supply reservoir for process and human use; sediment retention and water treatment facilities for the mine area facilities; accommodation for workers; a power supply system and transportation system to the coast. An airstrip was constructed in 1982. A port facility would be located along the Chukchi Sea coast. Facilities required in the coastal zone include a dock with shiploading facilities, concentrate and fuel storage and handling facilities, equipment storage and maintenance facilities, housing and a power plant.

A concise description of project history, land status, mining, milling and transportation options as well as siting options for each component of the Red Dog project is provided in the "Red Dog Mine Project Overview" released by Cominco Alaska Inc. in January, 1983 (1). Cominco Alaska has completed a preliminary evaluation of these options and has identified what seem to be the most feasible options from an environmental, economic and engineering viewpoint. The preferred options include open pit mining with waste stockpiled above the preferred tailings impoundment site on the south fork of Red Dog Creek (Figure 3.1). The mill will be located on a known bedrock outcrop within the impoundment catchment area that allows gravity flow of tailings slurry from the concentrator. A water storage reservoir, required for year round operation of the mill as well as domestic water supply will be created by constructing a dam on Bons Creek at the south end of the Red Dog valley with a pipeline following the road system to the mill. The preferred option for land transportation utilizes the southern corridor through Krusenstern National Monument to the coast with concentrate storage and shipping facilities at VABM 28 on the coast. Development of the project according to preferred siting options will ultimately disturb 2,070 acres of land including 1,500 acres over a 50 year period at the mine site, 520 acres along the transportation corridor and 50 acres at the coastal shipping facility (Table 3.1).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ORE BODY
MILL
TAILINGS IMPOUNDMENT
MAIN WASTE AREA
DRAINAGE AREA
DIVERSION DITCH
AIRPORT

FIG. 3.1

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Table 3.1: Nature and Extent of Land Disturbance Associated with Red Dog Mine Project[1]

Type of Disturbance	Land Area (acres)	Vegetation Type[2]
1. Mine Site		
Mine, waste dumps, access road	580	II-C1, II-B1
Tailing pond, access road	730	II-B1, III-C1, IIC1
Water supply pond, access road	95	II-C1
Mill incl. residence area & access road	65	III-C1
Airstrip, service corridors	30	II-C1, III-C1, II-B3
Mine site sub-total	1,500	
2. Transportation Corridor		
Southern corridor	435	III-C2, II-B1, II-B3, II-B2
Borrow pits incl. access roads	85	Sites unknown
Transportation corridor sub-total	520	
3. Port		
Port facility	50	III-A4, III-C3
Total land disturbance	2,070	

Footnote:

1. Source: Faxcom from D.F. Vinish, CESL Trail to H.A. Noah, Cominco Alaska, October 26, 1982.

2. Erikson, D.E. & L.R. Hettinger. Terrestrial Biology. In Environmental Baseline Studies Red Dog Project, Dames and Moore, January, 1983.

4. Environmental Setting

The Red Dog project is situated in the Wulik River drainage of the DeLong Mountains. The ore deposit is located in the drainage area of the main fork of Red Dog Creek. This creek is a tributary to Ikalukrok Creek, itself a major tributary of the Wulik River. The Wulik River empties into the Kivalina Lagoon, which opens into the Chukchi Sea near the village of Kivalina.

Local topography at the mine site consists of moderately sloping hills with elevation ranging from 800 to 1,500 feet. Surrounding the deposit to the north and east are the rugged ridges of the DeLong Mountains. In the west and southwest, the fringing hills of the DeLong Mountains drop off sharply to a gentle coastal upland.

Terrestrial, aquatic and marine biology and water quality data were developed during 1981 and 1982 for the project area to provide a data base upon which to base project impact analyses and to provide information on natural resources that could be used as input in optimizing mine facilities from both the engineering and environmental standpoints. Information pertinent to development of an environmental protection and reclamation plan for the project are summarized. Full details of the methodology used and the findings in the on-site investigations can be found in the report, "Environmental

Baseline Studies - Red Dog Project" which was prepared by Dames and Moore in January, 1983 (2).

4.1 Water Quality

Water in the Wulik River displays quality characteristics typical of unpolluted fresh water in the Arctic. These are clear water streams having low levels of colour, suspended solids, turbidity and nutrients. The water is highly oxygenated, moderately hard to hard, and of the calcium bicarbonate type. The pH is essentially neutral and levels of most trace elements fall within ranges acceptable for fresh water aquatic life. Water in Ikalukrok Creek exhibits characteristics similar to the Wulik River with one exception. The concentrations of some metals increase as one approaches the confluence with Red Dog Creek.

Red Dog Creek presents a contrast in water quality. The upper portion of the mainstem, most of the South Fork, and the North Fork exhibit high water quality. Water in the mainstem beginning adjacent to the highly mineralized showing area becomes degraded and remains in this condition downstream to the confluence with the South Fork. The middle portion of this section of creek manifests the lowest water quality. Cadmium, lead, zinc and iron concentrations can be particularly high in this section of the mainstem. Dissolved oxygen levels decrease, alkalinity levels decrease to or near zero, and pH is slightly acidic. The water type changes from calcium bicarbonate to calcium and magnesium bicarbonate or to magnesium and sodium sulphate depending on flow. The water is soft to moderately hard. Turbidity, suspended solids, and sulphate levels are generally high in this area. Recovery begins at the confluence of the mainstem and the South Fork, but it is not particularly significant until flow from the North Fork dilutes the mainstem. Red Dog Creek adversely affects the quality of Ikalukrok Creek below their confluence. This effect, at least in terms of zinc concentrations, extends several miles downstream in Ikalukrok Creek.

4.2 Aquatic Biology

The Wulik River system is an important overwintering area for Arctic char. Chum and pink salmon also spawn in the system. Primary utilization of Wulik fish is in the subsistence harvest of char by Kivalina and Noatak natives. Arctic grayling are found throughout the system but are not widely utilized.

Ikalukrok Creek has several documented char spawning areas from seven to 19 miles downstream of the mouth of Red Dog Creek and some possible char overwintering areas about nine miles downstream of the mouth of the Red Dog but no specific spawning areas have been located in this reach or upstream. Rearing of char fry and yearlings is commonplace upstream to above the mouth of Red Dog Creek. Growth of juvenile char in the Wulik system is excellent compared to that in other Arctic Alaska populations. Dud Creek, which enters the Ikalukrok about eight miles below the mouth of Red Dog Creek, has a small char spawning population and is an important rearing stream.

The Red Dog mineralization has been shown to have a profound effect on the water quality and hence the aquatic ecology of not only Red Dog Creek itself, but also Ikalukrok Creek for some distance downstream. Within much of the mainstem of the Red Dog this influence is graphically demonstrated by the absence or near absence of periphyton, macrophytes, insects and fish.

A spawning population of grayling in the North Fork of Red Dog Creek reaches this clean water tributary by migrating upstream through the mainstem during spring runoff when metal levels are relatively low. Char and grayling juveniles entering Red Dog Creek from Ikalukrok Creek or from the North Fork (grayling only) suffer heavy mortalities from exposure to metals. Living grayling fry in lower Red Dog Creek displayed abnormal escape reactions and were apparently near death. No fish have been found in Red Dog Creek above the mouth of the North Fork.

In Ikalukrok Creek, Red Dog Creek's influence can be seen in effects on periphyton, benthic macroflora (mosses) and insects to at least 0.3 miles downstream of the confluence. Fish in this same reach are exposed to, and survive in, levels of metals (especially cadmium and zinc) near or above EPA recommended criteria for the protection of aquatic life. One result of this exposure is the increased level of various metals seen in the tissues of fish, primarily grayling, in upper reaches of Ikalukrok Creek. Maximum levels in both char and grayling were usually from fish with greatest potential exposure to Red Dog Creek. While increases in tissue levels of certain metals appeared significant, they were all within established guidelines for edible fish.

4.3 Terrestrial Biology

Twelve vegetation types were delineated for the study area, and encompassed tall shrub, low shrub and herbaceous lifeforms. Tussock tundra was by far the most abundant type, but low shrub tundra, open low shrub and complexes of these vegetation categories were also common. Wetland vegetation occurs on about five percent of the area crossed by the proposed transportation corridors. Except for wetlands, no known critical plant habitats occur along the corridors and no candidate threatened or endangered species are known to occur in the area.

The avifauna of the study area is primarily composed of water-oriented birds. One hundred and four species were identified in ten different ecological formations. The lake, pond and lagoon habitats were the most heavily used of the aquatic formations and the tall and low shrub formations along streams or lakes were the most heavily used terrestrial habitats.

During spring migration, the most important staging areas are located in lagoons at the mouth of major river systems, especially those having large areas of the delta habitat. One of the major staging areas is located in Ipiavik Lagoon, just north of the proposed southern port site. The delta habitats are even more important during the fall migration when they are heavily utilized by shorebirds, swans, geese, and ducks. On a regional basis, however, numbers of birds using the lagoon systems within the study area are relatively low compared to nearby areas in Kotzebue Sound. The gravel ocean beaches had very low utilization in summer and fall. Glaucous gulls and arctic terns are characteristic of birds found in this habitat, the latter using this habitat for nesting.

The endangered peregrine falcon is the only threatened or endangered bird species known to occur in the project area. A total of seven sites were documented as having peregrine falcon activity. One of these sites was questionable. These sites require certain restrictions regarding development or disturbance activities. Both transportation corridors pass an equal number of sites but present alignments are outside of the two mile minimum buffer restrictions. Golden eagles, protected under the Bald Eagle Act, occur along both corridors but the restrictions protecting golden eagles are not as stringent as those for endangered species. No falcon or golden eagle nests were located near either the northern or southern port sites.

In recent years, caribou have used the Wulik and Kivalina drainages for winter range. Within these drainages actual distribution during the winter months is probably dependent on local weather conditions (i.e. snow depth). In spring, the caribou leave the winter range and make their way north through the DeLong Mountains to their traditional calving grounds on the Arctic Slope. Only a few stragglers remain in the study area during late spring and early summer and none of these animals were found to calve in this area. By mid-June, caribou (mostly bulls and yearlings) were abundant in the southern foothills of the DeLong Mountains, distributed in small bands. Shrub habitats were utilized most frequently. The largest movement of caribou occurred in early July when 10's of thousands of animals, in post-calving aggregations, passed through the upper drainage of the Kivalina River from the Spiny Ridge area and moved through the mountain drainages to the east in the traditional counter-clockwise fashion. These aggregations consist of all segments of the herd. Most of the animals return to the Arctic Slope to spend the summer. The number of caribou residing in the study area in the late summer season appeared to be low. Caribou return to the wintering areas in the Wulik and Kivalina drainages in late fall primarily from the northwest but some may come into the area from the Noatak region. The number of animals using the study area from year to year is highly variable.

A herd of eight muskox were sighted several times during the field season. The herd appears to have established its winter range in the Rabbit Creek drainage over the last several years. During the summer months, these animals were found to range extensively in the study area and move in an apparent clockwise fashion throughout the season.

Moose are not abundant and are generally restricted in winter to the tall willow habitat along the Wulik River and Ikalukrok Creek. These same tall shrub areas are used in the summer but there is also a dispersal of moose to upland mountainous areas and throughout smaller drainages that are not used in the winter.

Grizzly/brown bear were found throughout the study area during the 1982 field season. The distribution of these wide-ranging animals appears to vary seasonally. Upper mountainous areas are favoured in the spring while coastal areas are favoured in the summer and fall. Bears were concentrated along spawning streams when fish were present. Concentrations were observed along the Wulik River, Ikalukrok Creek and Asikpak River. Only one area was located in the Sivak Mountain area of the Asikpak River drainage where extensive denning was observed (several dens).

Small mammals were scarce in the study area in 1982. Typically one would expect to find two species of shrews (the arctic and masked shrew), three species of voles (the red-backed, the tundra vole and the singing vole), and two species of lemmings (the collard and brown lemming). These animals are of major importance mainly as prey for other mammals and birds. Other small mammals found to occur in the study area are the ermine, porcupine, arctic ground squirrel, muskrat, river otter and snowshoe hare.

Some larger predatory animals found in the study area are the wolverine, wolf, red fox and the arctic fox. These furbearers are important to the local economy.

4.4 Marine Biology

The nearshore coastal region and open lagoons in the vicinity of alternative port sites are used by migrating anadromous fish, such as Arctic char and salmon, as a transportation corridor between spawning rivers and the Chukchi Sea. Both outmigrating fish and those returning to spawn are present at different times of the year. Precise migration routes and timing in the vicinity of possible port sites has not been established.

Numerous resident marine fish are abundant in the relatively shallow waters nearshore. These include flounders such as yellow-fin sole and Alaska plaice as well as saffron cod. These fish are important components of the diet of marine mammals such as seals. Densities of these fish appear to be similar at all locations studied, both within and away from the project vicinity. Large numbers of Pacific herring spawn along the coast between Kivalina and Mapsorak Lagoon.

Significant populations of invertebrate species that are important prey items for fish are found in the region. These include infauna, such as clams and polychaete worms, and epifauna, such as shrimp, crab, brittle stars, and other, smaller crustaceans.

Seabirds (murres, puffins, kittiwakes) from the Cape Thompson colonies did not appear to use the nearshore areas to any significant degree and were usually observed in waters beyond the 40 foot isobath. No major foraging areas were located in the nearshore waters.

Several species of waterfowl (primarily eiders) use the area seaward of the landfast ice as a spring migration corridor to the northwest and around Point Hope. These birds number in the tens of thousands.

Ringed seals are the most abundant marine mammal using the shorefast ice with the highest densities associated with heavily fractured ice at the southern port area in late May. Bearded seals occur in low densities throughout the fast ice. Both species leave during the open-water period.

The belukha and endangered bowhead whales migrate through the open leads off Kivalina during late April-early May. Whales tentatively identified as bowheads were observed as late as the last week in June. During the fall on their southward migration to the wintering grounds, they are thought to pass through the western Chukchi, but no observations were reported in the study area.

Endangered gray whales were seen on several occasions during July and August along the coast from Cape Krusenstern to Point Hope usually in shallow water close to the beach. Since gray whales feed in shallow water, the likelihood of them encountering port structures would be greater than for other whale species.

5. Reclamation Plan

5.1 Introduction

A conceptual plan for the protection and reclamation of land and water resources affected by various components of the Red Dog project is presented. The plan provides for the reclamation of all disturbed lands in accordance with guidelines established by the NANA-Cominco Alaska agreement and any laws or regulations applicable to such reclamation activities. Features of the mine design which protect water quality and aquatic resources and minimize the extent and severity of disturbance to terrestrial resources are described. Due to the site specific nature of factors affecting revegetation potential of mined-land disturbances and to limited revegetation technology specific for conditions prevailing at the site, detailed plans for revegetating waste disposal sites are not presented in the conceptual plan. A research program will be implemented early in the production period of the mine to develop the technology necessary to achieve revegetation objectives.

5.2 Reclamation Guidelines

According to the NANA-Cominco Alaska agreement, the "Reclamation Plan" shall provide for reclamation within the following guidelines:

a) the parties recognize that reclamation of disturbed land is desirable,

b) the parties recognize that land disturbances related to surface mining and the deposition of tailings and waste rock are inevitable and complete return of all of the disturbed land to its undisturbed condition is not possible,

c) reclamation shall be generally designed to mitigate-

   (i) potential long term danger to human life or the subsistence needs of the natives of the NANA Region,

   (ii) any adverse visual or unaesthetic conditions, and

   (iii) to the extent reasonably practicable, to restore the land to a condition compatible with surrounding land,

d) disturbed land shall be restored to natural looking contours compatible with the surrounding terrain (it being recognized that the area of the mine excavation will not be refilled),

e) where available in appropriate quantities, topsoil shall be separately removed and stockpiled for further application after reshaping of disturbed areas have been completed; provided that the parties recognize that permafrost conditions could cause long-term stockpiling of topsoil to be impractical,

f) appropriate measures shall be taken to control or reduce erosion, landslides and water runoff to the extent practicable,

g) fisheries and wildlife habitats shall be rehabilitated to the extent practicable,

h) to the extent practicable, disturbed areas shall, through seeding, fertilizing and other appropriate means, be revegetated with a diverse vegetative cover of species native to the area and similar to that on adjoining areas.

A reclamation and post-production accrual fund to cover reclamation and all other post-production expenditures will be established. Cominco Alaska will maintain a performance bond underwriting the reclamation as required by the agreement with NANA.

While it is desirable to initiate reclamation as early as possible following disturbance, the main project components of the mine site, the transportation corridor and the shipping facility will be active for the duration of the project life. Reclamation of these components must, therefore, be delayed until late in the operating life of the mine and following abandonment. It is also conceivable that certain project components, notably the transportation and port systems, can be utilized by the region beyond the operating life of the mine and reclamation of these major services may not be required.

Reclamation concepts for the main project components at the mine site, the transportation corridor and the shipping facility are presented in the following sections of this document.

5.3 Reclamation Concepts for the Mine Site

Land disturbance at the mine site totals 1,500 acres and includes the following components (3):

Open pit, waste dumps, access roads	580 ac.
Tailings pond, access roads	730 ac.
Water supply reservoir, access roads	95 ac.
Mill including residence, access road	65 ac.
Airstrip, service corridors	30 ac.

A reclamation concept for each mine site component is discussed.

5.3.1 Open Pit Mine

The Red Dog deposit is exposed between 950 feet and 1,200 feet elevation on a northeast facing slope within the drainage of the main fork of Red Dog Creek. The deposit is located within an area mapped as dwarf shrub, mat and cushion tundra vegetation type (2). Dwarf shrub vegetation is primarily associated with upland ridges and bedrock outcroppings above 800 feet elevation. The tundra vegetation is alpine in appearance with the richness of the vegetation dependent largely on moisture. Drier sites typically are characterized by lichen encrusted rock with only scattered prostrate shrubs. White mountain avens (Dryas octapetala) in association with a number of co-dominant species form a number of different plant communities recognized within the mat and cushion tundra category. No critical plant habitats and no threatened or endangered plant species are known to occur in the area.

Soils of the mat and cushion tundra typically contain stony parent material near the surface. Profiles are therefore shallow and mineral in nature except for a thin (0.8" to 2") organic horizon at the surface (2). Shallow soil samples within the mine area were variably elevated in metals zinc, lead, copper and iron. Potential for conserving soil suitable for reclamation appears minimal.

The Red Dog mineralization has had a profound effect on water quality and aquatic resources within the mainstem of Red Dog Creek (2). Water is highly mineralized, exhibits low pH levels and relatively high suspended solids, turbidity, sulphate and metal concentrations. Periphyton, macrophytes, insects and fish are absent or near absent.

The outcropping orebody and its geological configuration dictate open pit mining as the most feasible mining method (Figure 5.1). The pit will be developed in two stages: preproduction followed by production mining. During preproduction overburden is removed from the pit; access roads to the pit, pit ramps and initial benches are established. Unmineralized waste will be used for road and tailing dam construction. Mineralized waste will be stockpiled in a catchment area above the tailings impoundment. Production mining will involve the annual extraction of 1,057,000 tons ore.

The open pit will be designed to optimize ore recovery with due consideration of the Red Dog Creek adjacent to the pit area (1). Pit slopes are designed at 35° (1½:1) and will be confirmed by rock mechanics design. Benches are 25 feet high. The final pit could be 2,800 ft. x 1,000 ft. in plan area (64 ac.) and contain up to 28 benches to the 500 ft. elevation. A ditch/dyke system will be designed to capture

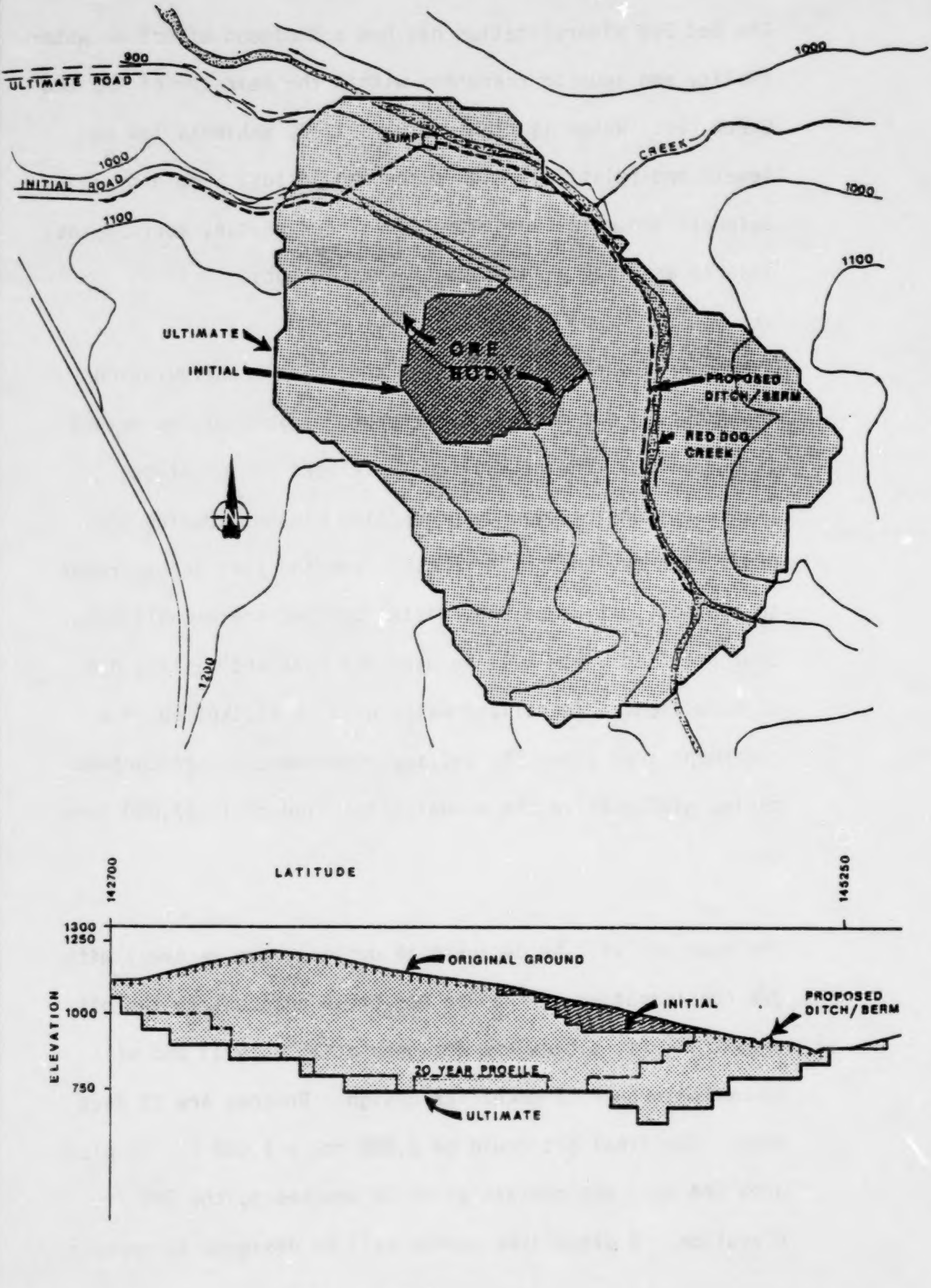

900
ULTIMATE ROAD
1000
INITIAL ROAD
1100
SUMP
CREEK
1000
1000
1100
ULTIMATE
INITIAL
ORE BODY
PROPOSED DITCH/BERM
RED DOG CREEK
N
1200
142700
LATITUDE
145250
1300
1250
1000
750
ELEVATION
ORIGINAL GROUND
INITIAL
PROPOSED DITCH/BERM
20 YEAR PROFILE
ULTIMATE

FIG. 5.1 MINE PIT LAYOUT

runoff from the pit working area and divert it to the tailing impoundment resulting in an improvement in the quality of Red Dog Creek during the production period.

After 20 years the creek course will have to be diverted to allow continued mining of the deposit. It is planned to design a wide bench at creek level on which a diversion ditch will be constructed to route the creek around the perimeter of the pit. Design and function of both the ditch/dyke and the bench diversion ditch are described in "Wastewater Collection and Management, Red Dog Project", issued in May, 1983(4).

Reclamation of the pit poses unusual problems because of the proximity of the orebody to the mainstem of Red Dog Creek, the landform created by the open pit mining technique and the consolidated nature of bedrock exposed by mining. The pit will ultimately cross the present creek location and its depth will be substantially below creek level. Backfilling the pit, resloping pit walls to natural contours compatible with surrounding terrain and restoring the Red Dog Creek course are not practical. Any requirement to implement any of these measures would destroy the economics of the project.

Upon completion of mining Red Dog Creek will be diverted back along its original course flowing into the pit, eventually raising the water level in the pit to approximately 900 feet, the elevation of Red Dog Creek at the downstream extremity of the pit. A reservoir will be created within the Red Dog drainage system with water ranging up to 400 ft. deep with steep, rock cliffs along the shoreline. Abandoned pit access ramps will provide access to the water. Pit walls will rise up to 300 feet above the reservoir on the west side and up to 260 feet on the east side. Exposed sections of the pit wall will consist of up to 12 benches, 25 feet high and 35 feet wide, in consolidated unmineralized and, to a much lesser extent, mineralized rock. Surface drainage from the pit walls will be retained within the pit area. Due to the consolidated nature of the rock vegetation establishment on the benches may not be possible.

Since the mining plan calls for the recovery of all ore with a high metal sulphide content, the contribution of soluble metals to Red Dog Creek from the mine area will be minimal after operations cease. The pit will thereafter function as a reservoir in the watershed system with substantially improved quality over that under present conditions.

5.3.2 Mine Waste Dumps

Mineralized and unmineralized waste material which is not suitable for mill processing will be stockpiled on the east side of the South Fork Red Dog Creek drainage area above the proposed tailing impoundment site (Figure 5.2). Mine waste stockpiles will be constructed on stable ground on a 10% west facing slope between 950 feet and 1,200 feet elevation. The extent of slide areas identified on the slope will be clarified by geotechnical investigation and unstable areas will be avoided.

Two vegetation types were mapped on the west facing slope of the South Fork drainage; dwarf shrub mat and cushion tundra and low shrub tundra (2). Well-drained upland knolls and slightly more mesic habitats of mat and cushion tundra are characterized by white mountain avens in association with skeletonleaf willow (*Salix phlebophylla*) and netleaf willow (*S. reticulata*). Dwarf arctic birch (*Betula nana*) and narrowleaf Labrador-tea (*Ledum decumbens*) form a dwarf shrub community on the more mesic sites such as swales and areas of thicker mineral soil. Low shrub tundra vegetation of dwarf arctic birch, crowberry (*Empetrum nigrum*) and bog blueberry (*Vaccinium uliginosum*) is quite common on upland rolling hills. Diamondleaf willow also appears as a co-dominant with dwarf arctic birch, narrowleaf Labrador-tea and Vaccinium species in some areas of silty soils on rolling terrain. No wetlands, critical plant habitats or endangered plant species are known to occur in the area.

Soils typical of mat and cushion tundra were described in section 5.3.1. Soils of low shrub tundra are mineral, generally silty, and usually well to moderately well drained (2). The drainage is a reflection of the upland landscape position and relatively steep slopes. The active layer is variable,but usually less than 28 inches. The silty soil material is potentially suitable as a plant growth medium for waste dump revegetation. Conservation of the active silt layer during preparation of waste dump sites, if located on soils similar to those described for the low shrub vegetation type, will be investigated.

Water quality and aquatic ecology of the South Fork of Red Dog Creek have also been affected by the Red Dog mineralization. While the South Fork is described as a clear water stream having low suspended solids and turbidity with high dissolved oxygen levels; the water is soft to moderately hard, has low pH with moderate to high cadmium and high zinc concentrations. The major source of Cd and Zn is a tributary draining a portion of the slope east of the creek. No fish are known to exist in the South Fork of Red Dog Creek.

Separate waste dumps will be constructed with capacity for stockpiling 29 million tons of unmineralized waste and 11 million tons of leachable mineralized waste. Most of the unmineralized waste removed during pit development and the initial five years of mining will be used for road and tailing dam construction. Waste dumps will be constructed on the 10% natural slope by dumping and spreading waste in 10 to 20 foot thick lifts to a maximum dump height of 120 feet (4). Toes of the waste dump will be keyed to competent load bearing material to prevent failure. The planned dumping technique is designed to increase dump stability, accelerate freezing of the dump and prevent leaching. The resultant dump will have a flat central area with the same slope as the underlying natural terrain but with steep perimeter slopes averaging 35°.

Surface drainage and seepage during the initial phases of dump construction will be directed downslope into the tailing impoundment. However, as completed dumps stabilize hydraulic permeability will diminish and reduce the extent of leaching. Compaction of lift surfaces by vehicular traffic will inhibit infiltration of precipitation and diffusion of air, thereby restricting oxidation of sulphides. With development of permafrost conditions in the dump interior following completion of dump construction, leaching from waste dumps will cease.

Surface drainage contamination will be eliminated following revegetation of the waste dump surface.

The surface of the waste dumps will be reclaimed to an appearance compatible with the surrounding terrain. Waste dumps will be recontoured as required to achieve permanent slope stability and facilitate revegetation. Waste dumps present a harsh environment for establishing vegetation. Effective reclamation will be dependent upon development of practical site preparation techniques which improve conditions sufficiently such that self-sustaining vegetation indigenous to the region can be established successfully. Exposure to severe climatic conditions, steep perimeter slopes, a compacted rocky growth medium with a low content of fines and essential plant nutrients plus, in the case of mineralized waste, low pH and elevated concentrations of metals (6), are severe constraints to waste dump reclamation. Techniques will be developed, as needed, to mitigate site specific reclamation constraints during the projects operating period.

5.3.3 Tailings Impoundment

Finely ground rock tailing, a waste produced during concentration of minerals in the ore, will be impounded in the drainage of the South Fork of Red Dog Creek behind an impervious earth fill dam (Figure 5.2). The site meets all of the planning criteria with particular

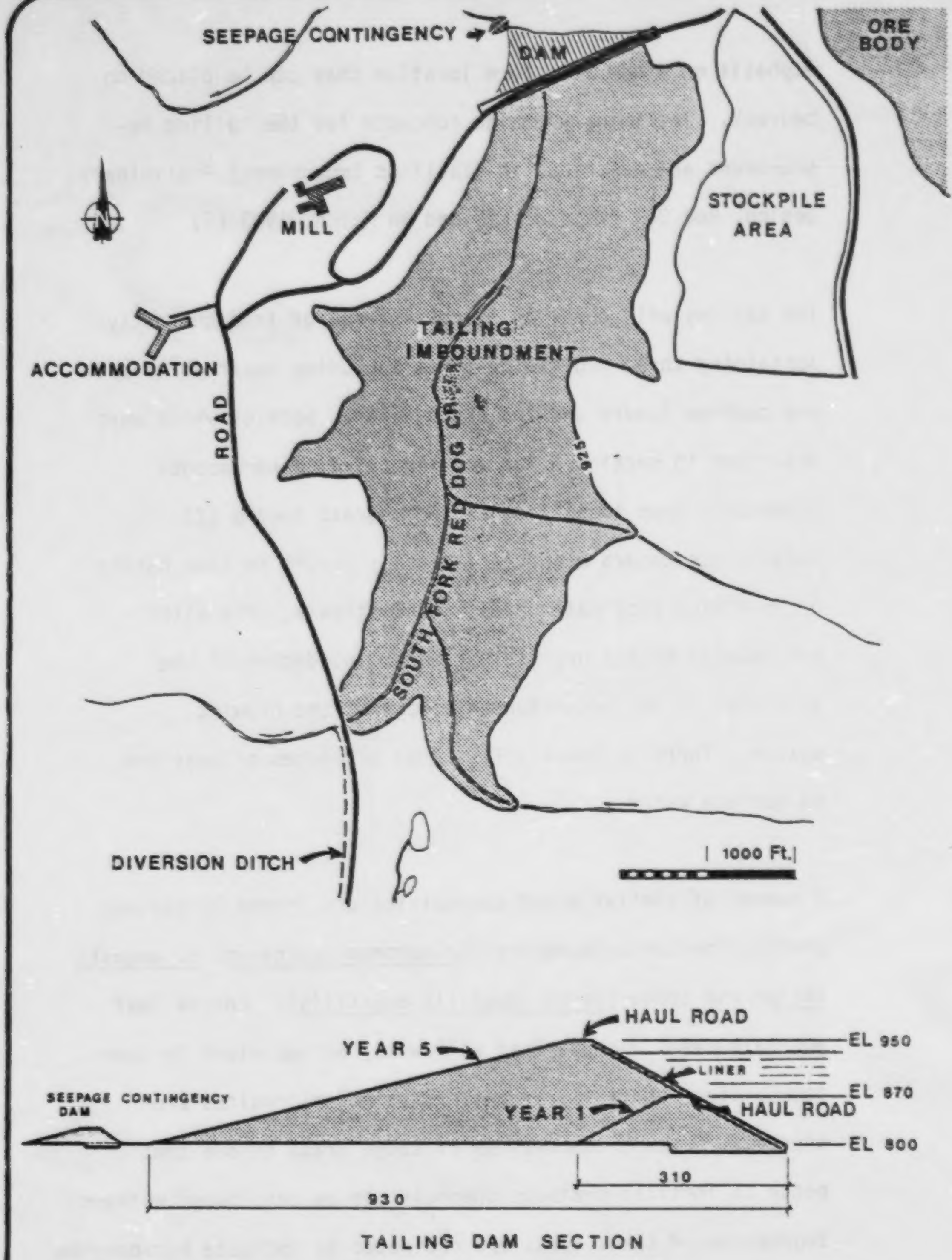

SEEPAGE CONTINGENCY
DAM
ORE BODY
STOCKPILE AREA
MILL
N
TAILING IMPOUNDMENT
ACCOMMODATION
ROAD
SOUTH FORK RED DOG CREEK
925
DIVERSION DITCH
1000 Ft.
HAUL ROAD
YEAR 5
EL 950
LINER
EL 870
SEEPAGE CONTINGENCY DAM
YEAR 1
HAUL ROAD
EL 800
310
930
TAILING DAM SECTION

FIG. 5.2 SOUTH FORK TAILING IMPOUNDMENT

emphasis on a dam structure location that can be placed on bedrock. Preliminary design concepts for the tailing impoundment are described in "Tailings Impoundment Preliminary Design, Red Dog Project", issued in March, 1983 (5).

The tailing will cover an extensive area of land currently sustaining three vegetation types including dwarf shrub mat and cushion tundra and low shrub tundra, both of which were described in section 5.3.2 and the third, a herbaceous vegetation type identified as sedge-grass tundra (2). Sedge-grass tundra characteristically occurs in lake basins or in filled back water areas along streams. The sites are usually poorly drained but water inundation of the soil profile may occur for only part of the growing season. There is usually less than 12 inches of peat and no surface water.

A number of similar plant communities are formed by various combinations of cottongrass (*Eriophorum vaginatum*, *E. angustifolium* and sedge (*Carex aquatilis aquatilis*). Entire leaf mountain-avens and grayleaf willow may be important in some communities especially if better drained microsites are present. Certain communities of sedge grass tundra that occur in infilled drainage channels can be considered wetlands. Vegetation of these types are dominated by obligate hydrophytes including *Carex aquatilis*, *Arctophila fulva*, *Huppurus vulgaris*, and Friophorum angustifolium. Except for some possible wetlands, no critical plant habitats and no threatened or endangered plant species are known to occur in the tailing impoundment site.

Soils typical of mat and cushion tundra and low shrub tundra vegetation types were described in sections 5.3.1 and 5.3.2. Typical soils of the sedge-grass tundra are organic, usually of sedge peat with an active layer depth of about 60 cm. Silty mineral inclusions, when present, are gleyed or mottled indicating frequent water inundation. Both the organic soils typical of sedge-grass tundra and the silty mineral soils typical of low shrub tundra have potential as suitable plant growth media. Conservation of these important soil resources may be critical to effective reclamation of waste rock and tailing disposal areas.

An earth-fill dam, with a base elevation of 800 feet, will be constructed in stages as described in the document "Tailings Impoundment Preliminary Design, Red Dog Project" (5). Prior to full production, the dam would be constructed to sufficiently contain five years of production tailing. The dam will then be raised to its final elevation of 950 feet. The top of the dam will be used as a haulage road to haul ore from the pit to the mill complex. A spillway, constructed at 944 feet elevation, will maintain structural competence in the event of an overflow. A downstream seepage contingency structure will collect any seepage and return it to the impoundment area.

The thickened tailings slurry will be discharged into the impoundment area from a pipeline originating from the mill. The slurry will contain about 60% solids by weight, with the liquid portion consisting of excess process water, dissolved minerals and residual reagents. Tributaries of the South Fork with known heavy metal content will continue to drain into the impoundment while uncontaminated streams will be diverted into adjacent watersheds. Surface drainage from the mine, from mine waste dumps and the mill site will also be collected in the tailing impoundment. Water entering the impoundment will be processed through a water treatment plant to remove any metals prior to discharge to the presently contaminated Red Dog Creek. Details of the water treatment plant and process are described in "Wastewater Collection and Managament, Red Dog Project" issued in May, 1983 (4).

A reclamation scheme is proposed for the tailing impoundment which assumes relief from E.P.A. regulations restricting discharge to Red Dog Creek of any water associated with the disposal of tailing. When operation of the tailing impoundment is terminated, it is proposed that all free standing supernatant water will be treated and discharged to Red Dog Creek, exposing an extensive flat landform composed of tailings. Lined channels in the tailings and dam breaches with stabilized spillways will be constructed to prevent collection of surface drainage within the impoundment area and to channel flow of the South Fork of Red Dog Creek and its tributaries into Red Dog Creek. The tailings mass is expected to freeze becoming part of the underlying permafrost. If practical, the surface of the dam and tailings impoundment will be restored to an appearance resembling that of the surrounding terrain.

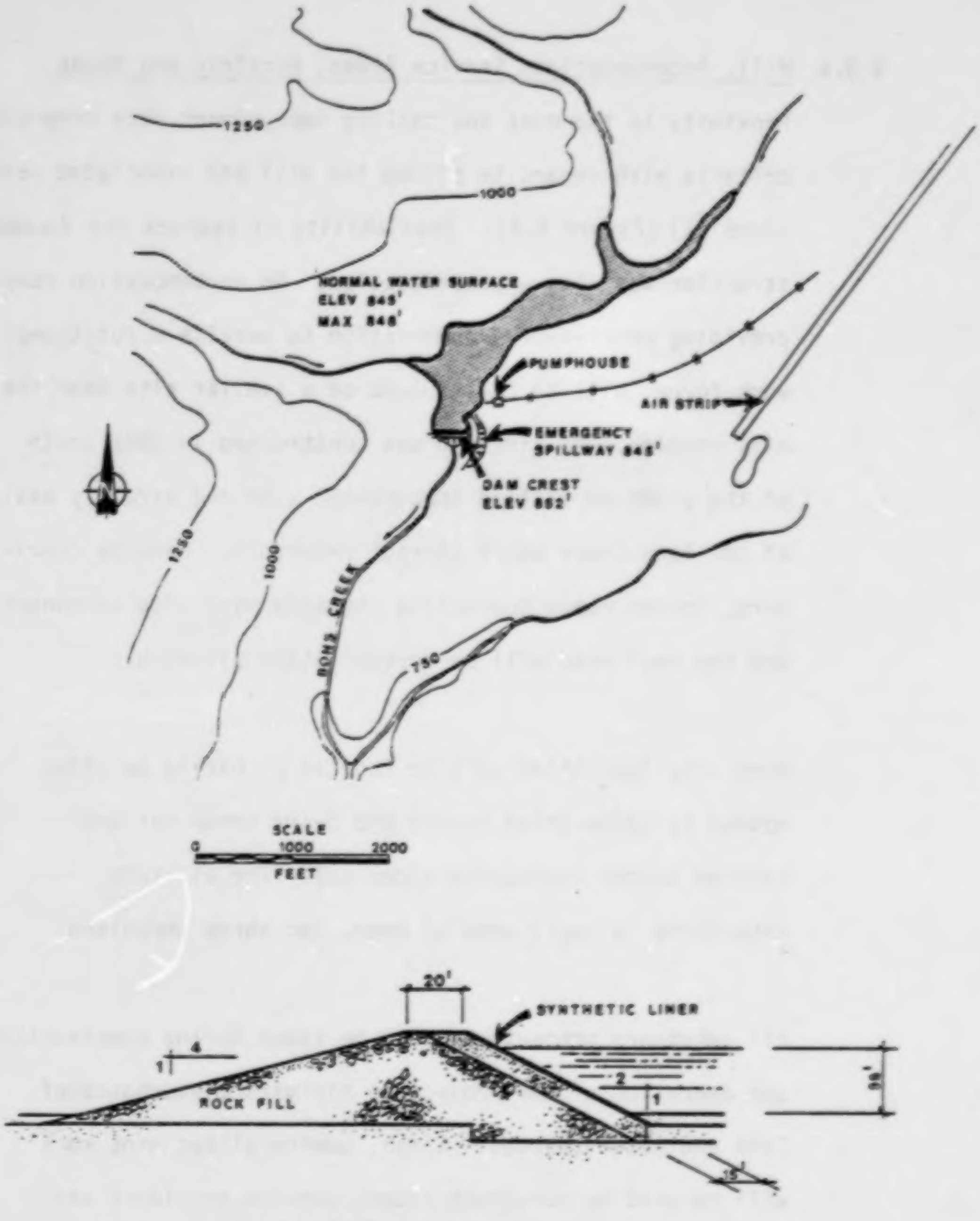
As is the case with mine waste, tailing present a harsh environment for vegetation establishment and practical, site specific reclamation techniques require development. Preliminary tailing incubation test results suggest exposure of tailings to atmospheric conditions will cause a decrease in pH to within the strongly acid range ($pH < 4.5$) with a concomitant increase in metal solubility particularly zinc (6). Restoring a near neutral tailings reaction by liming or covering tailing with a more suitable plant growth medium may be necessary for satisfactory vegetation establishment.

5.3.4 Water Supply Reservoir

A water storage reservoir will be required to ensure an uninterrupted supply of water for year round operation of the mill, the major consumer of water for the Red Dog project, and for domestic use. The preferred site for the reservoir is on Bons Creek at the south end of the Red Dog Valley (Figure 5.3). A dam structure will be required and the reservoir location situates a dam on a bedrock foundation. The natural geographic features of the site minimizes the disturbed surface area for the required storage volume.

The site presently sustains dwarf shrub mat and cushion tundra vegetation (2). Bons Creek water quality is typical of unpolluted arctic surface waters and is acceptable for domestic use. There are no known critical plant or animal habitat on the site.

Current options for abandonment of the water storage reservoir and dam are to either breach the structure to prevent subsequent storage or allow it to continue discharging by a permanent spillway. An evaluation of hydrological and dam stability conditions which prevail at the time of property closure is required to determine the most satisfactory option.


1250
1000
NORMAL WATER SURFACE
ELEV 845'
MAX 848'
PUMPHOUSE
AIR STRIP
EMERGENCY
SPILLWAY 848'
DAM CREST
ELEV 852'
N
1250
1000
BONS CREEK
750
SCALE
0
1000
2000
FEET
20'
SYNTHETIC LINER
4
1
ROCK FILL
2
1
96'
15'

SECTION — DAM

FIG. 5.3 WATER STORAGE POND

5.3.5 Mill, Accommodation, Service Areas, Airstrip and Roads

Proximity to the mine and tailing impoundment were determining criteria with regard to siting the mill and associated services (1) (Figure 5.4). Availability of bedrock for foundation construction was also a consideration. An accommodation complex, providing hotel-type accommodation to service a rotational work force, will be constructed on a similar site near the mill complex. An airstrip was constructed in 1982 south of the proposed tailing impoundment site and directly east of the Bons Creek water storage reservoir. Service corridors, access roads connecting the main mine site components and the haul road will be appropriately situated.

Mine site facilities will be located primarily on sites mapped as sedge-grass tundra and dwarf shrub mat and cushion tundra vegetation types (2). The airstrip intersects a small area of open, low shrub shrubland.

All necessary precautions will be taken during construction and operation of the project to minimize disturbance of land and water courses. Clean, unmineralized mine rock will be used to construct roads, service corridors and service areas. Culverts and stream crossings will be appropriately sized and installed in a manner which minimizes stream sedimentation. Surface runoff from the mill site will be collected in the tailings impoundment

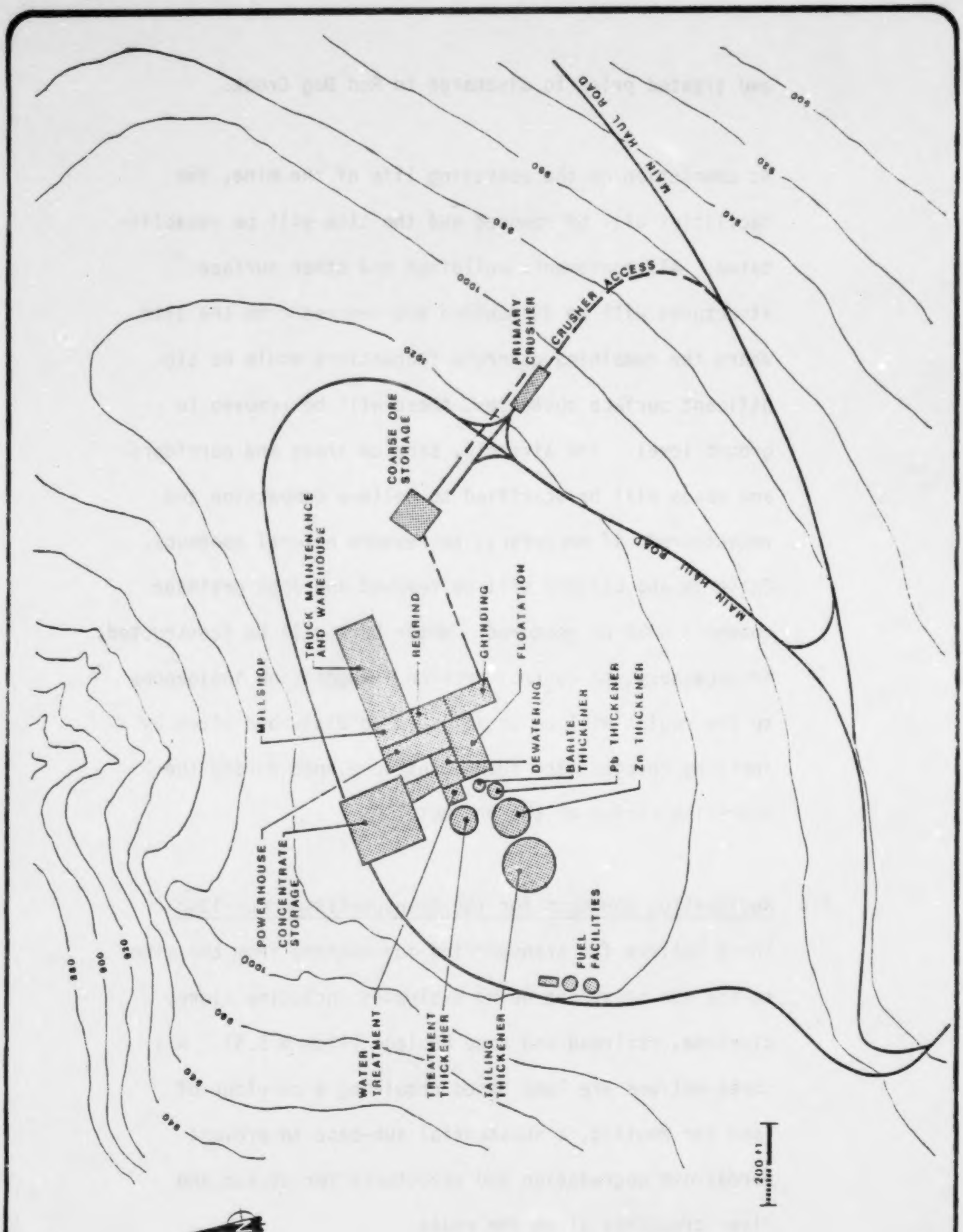

MAIN HAUL ROAD
CRUSHER ACCESS
PRIMARY CRUSHER
COARSE ORE STORAGE
TRUCK MAINTENANCE AND WAREHOUSE
MILLSHOP
REGRIND
GRINDING
FLOATATION
DEWATERING
BARITE THICKENER
Pb THICKENER
Zn THICKENER
POWERHOUSE
CONCENTRATE STORAGE
FUEL FACILITIES
WATER TREATMENT
TREATMENT THICKENER
TAILING THICKENER
MAIN HAUL ROAD
900
920
940
960
980
1000
1010
880
900
920
960
980
200 ft
N

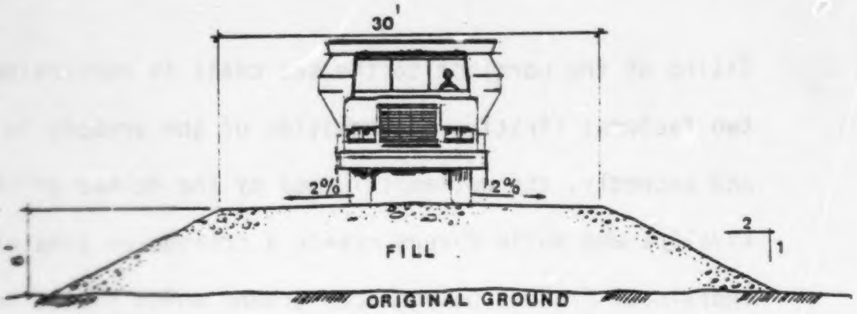
FIG 5.4 MILL SITE PLAN

and treated prior to discharge to Red Dog Creek.

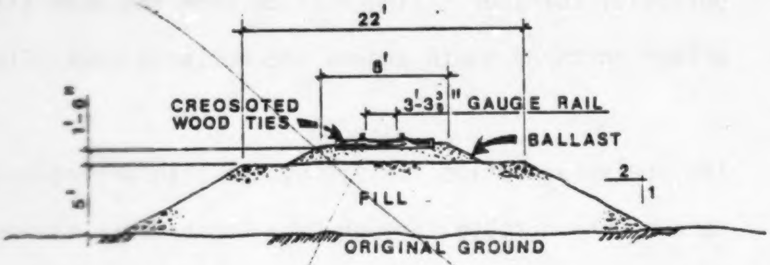
At completion of the operating life of the mine, the facilities will be removed and the site will be rehabilitated. All equipment, buildings and other surface structures will be dismantled and removed from the site. Where the remaining concrete foundations would be significant surface obstacles, these will be removed to ground level. The airstrip, service areas and corridors and roads will be scarified to relieve compaction and recontoured, if necessary, to restore natural contours. Culverts and bridges will be removed and open drainage channels will be restored. Water bars will be constructed, if necessary, to control erosion. Vegetation indigenous to the region will be established on disturbed sites by applying revegetation techniques developed during the operating period of the project.

5.4 Reclamation Concepts for the Transportation Corridor

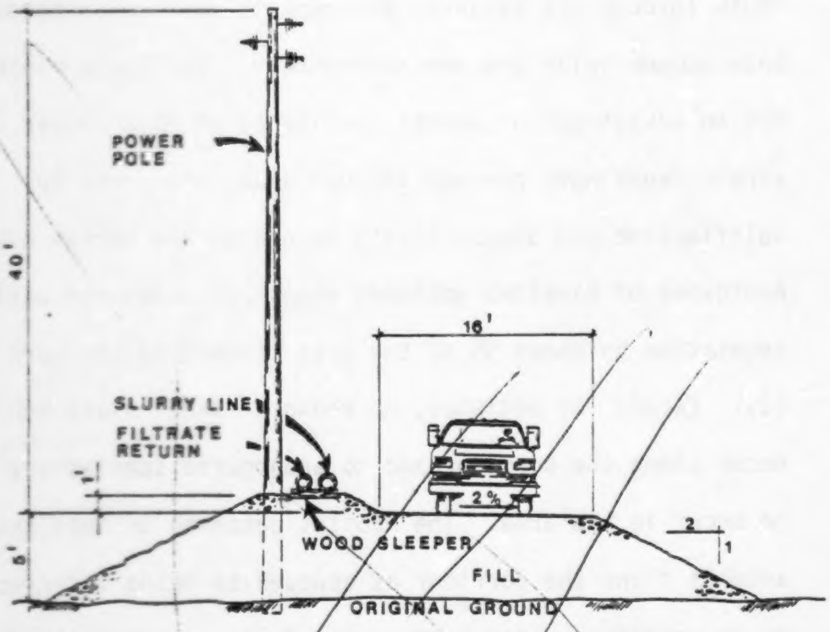
Three options for transporting concentrate from the mine to the sea coast are being evaluated including slurry pipeline, railroad and road haulage (Figure 5.5). All three options are land based requiring a corridor of land for routing, a substantial sub-base to prevent permafrost degradation and structures for stream and river crossings along the route.


30'
2%
2%
6'
2
1
FILL
ORIGINAL GROUND

TYPICAL ROAD SECTION


22'
8'
1'-0"
CREOSOTED WOOD TIES
3'-3½" GAUGE RAIL
BALLAST
5'
2
1
FILL
ORIGINAL GROUND

RAILROAD SECTION


POWER POLE
40'
16'
SLURRY LINE
FILTRATE RETURN
1'
WOOD SLEEPER
2%
5'
2
1
FILL
ORIGINAL GROUND

PIPELINE & SERVICE ROAD SECTION

FIG. 5.5 LAND TRANSPORT

Siting of the corridor to the sea coast is constrained by two factors; firstly, the position of the orebody is fixed, and secondly, the wetlands formed by the deltas of the Kivalina and Wulik Rivers create a triangular area of undrained, frozen, polygonical ground which should be avoided on both economic and environmental grounds. The potential corridor siting will be from the mine site either north or south around the wetlands area (Figure 5.6).

The preferred option for siting the transportation corridor is a southern route through Cape Krusenstern National Monument. While the political implications of land status for a route traversing Cape Krusenstern National Monument necessitates consideration of alternative routes, the direct route through the National Monument is most advantageous both economically and environmentally. Costs are minimized due to advantages of length, avoidance of major river and stream crossings, passage through areas not prone to solifluction and accessibility to gravel and borrow materials. Avoidance of Kivalina wetlands minimizes extent of wetland vegetation to about 5% of the area crossed by the corridor (2). Except for wetlands, no known critical plant habitats occur along the corridor and no endangered species are known to occur in the area. The habitat patterns of most game animals flank the corridor as opposed to being intersected by the corridor. Known peregrine falcon nesting sites

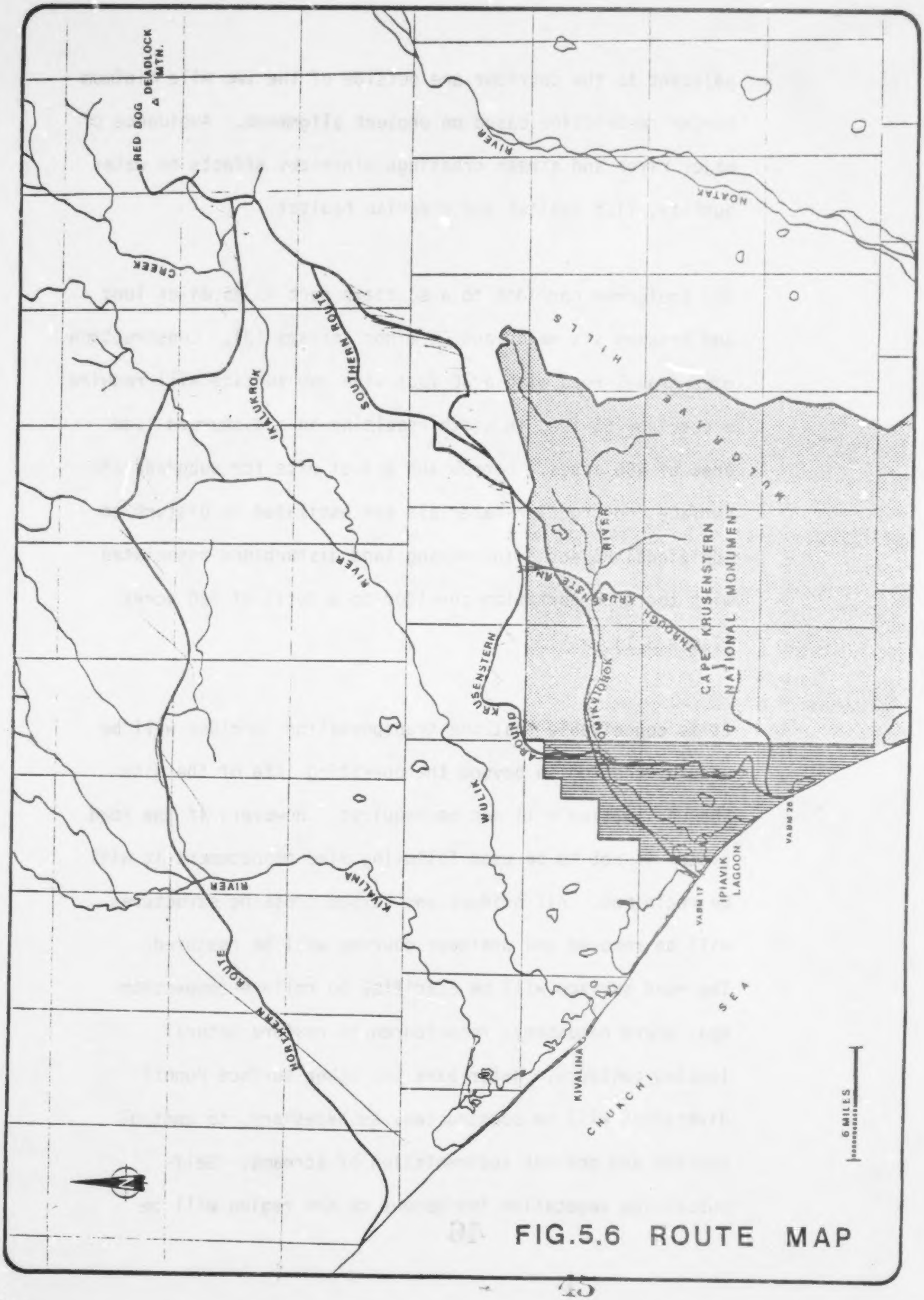

RED DOG DEADLOCK MTN.
CREEK
IKALUKROK
SOUTHERN ROUTE
NOATAK RIVER
HILLS
KRUSENSTERN RIVER
THROUGH ROUTE
OMIKVIOROK
CAPE KRUSENSTERN NATIONAL MONUMENT
AROUND KRUSENSTERN
WULIK RIVER
KIVALINA
NORTHERN ROUTE
KIVALINA
CHUKCHI SEA
IPIAVIK LAGOON
VABM 17
VABM 28
6 MILES
N

FIG.5.6 ROUTE MAP

adjacent to the corridor are outside of the two mile minimum buffer restriction based on present alignment. Avoidance of major river and stream crossings minimizes effects on water quality, fish habitat and riparian habitat.

The preferred corridor to a southern port is 55 miles long and crosses six major and 41 minor streams (3). Construction of a gravel road with a 30 foot wide top surface will require a corridor 65 feed in width resulting in a disturbed land area of 435 acres. Borrow and gravel pits for subgrade and surface construction materials are estimated to disturb an additional 85 acres increasing land disturbance associated with the transportation corridor to a total of 520 acres (Table 3.1).

It is conceivable that the transportation corridor will be used by the region beyond the operating life of the mine and reclamation will not be required. However, if the road system is not to be used following mine abandonment it will be reclaimed. All bridges and stream crossing structures will be removed and drainage courses will be restored. The road surface will be scarified to relieve compaction and, where necessary, recontoured to restore natural looking contours. Water bars and other surface runoff diversions will be constructed, as necessary, to control erosion and prevent sedimentation of streams. Self-sustaining vegetation indigenous to the region will be established on all disturbed surfaces. Borrow pits will be reclaimed immediately after their usefulness has terminated. If available, soils suitable for reclamation will be stockpiled and replaced on the abandoned pit surface prior to revegetation with native plants. Where practical, slopes will be recontoured to an appearance compatible with the surrounding terrain. Precautions will be taken, as necessary, to control surface runoff, both during the time the pits are active and following abandonment, to protect stream habitats from excessive sedimentation.

5.5 Reclamation Concepts for the Port-Shipping Facility

A port facility with concentrate storage to allow for year round receipt of concentrates shipped from the mine and suited for seasonal ocean shipping of concentrates to world markets will be constructed on the sea coast (1). The coastline is unsheltered and therefore exposed to sea and ice action. Lagoons along the coast could offer protection, but either support active marine habitats, or are very shallow. Near-shore waters are generally shallow and are a determining factor in the method of ocean transport. Important environmental aspects to be considered are the migration of waterfowl, anadromous fish and marine mammals, sediment transport and the perception by the people of an industrial facility on the coast.

Security in the methods for the storage and movement of concentrates and supplies must also be considered.

Siting of the port facility and alignment of the transportation corridor from the mine are co-determining. Shortest distance to deep water, the most economic land based transportation corridor and environmental concerns are important criteria for determining the preferred siting option. The logical terminus of the southern route through Krusenstern is at VABM 28 where the Mulgrave Hills intersect the Chukchi Sea (Figure 5.6). However, selection of VABM 28 for the port site depends upon resolution of land status issues arising from the proposed construction of the transportation corridor through Krusenstern National Monument.

The port facility will incorporate a deep water dock and shiploading facility with concentrate receiving, storage and handling facilities. Fuel storage and warehousing for supplies necessary to the operation of the mine are also an important function of the port. Assessment of optional facilities for docking, concentrate storage and handling and fuel storage has not been completed. It is assumed that on-shore facilities will be constructed on crushed rock and will disturb approximately 50 acres of land.

It is conceivable that the port system will be used by the region beyond the operating life of the mine and reclamation will not be required. In the event the facility is abandoned all buildings, equipment and other surface structures will be dismantled and removed from the site. Where the remaining concrete foundations would be significant surface obstacles, these will be removed to ground level. Crushed rock pads will be scarified to relieve compaction and perimeter slopes will be recontoured. Shoreline features will be restored following removal of the dock. Vegetation indigenous to the site will be established on the disturbed areas.

5.6 Reclamation Research Proposals

Effective reclamation of land disturbed by the Red Dog project will depend on application of site preparation and revegetation techniques capable of ameliorating conditions limiting establishment and growth of plant species native to the region. During the past decade considerable information useful for planning revegetation of Alaskan tundra disturbance has been developed in conjunction with other resource development in northern Alaska. While it is generally recognized that factors influencing vegetation establishment and growth vary with geographic setting of the mine, the nature of the ore deposit and the type of land disturbance, development of revegetation techniques for the various kinds of land disturbance at the Red Dog project will be based on currently available revegetation technology developed in Alaska and on reclamation experience at other Cominco mines in North America. During the operating period of the project revegetation techniques will be assessed and refined on sites representative of the major kinds of land disturbance. Prior to initiation of insitu investigations laboratory and growth room studies will be conducted on waste rock and tailing to identify plant growth limiting factors and to assess techniques for modifying mine and mill wastes to improve plant growth potential. Techniques investigated will depend on the nature and severity of factors identified as limiting growth on the various waste materials. Establishment of diverse, self-sustaining communities of native plant species will require development of effective propagation and planting techniques. Development of practical methods for conserving surficial soil material for use in reclamation of waste rock, tailing and borrow pits may also be necessary. Early during the operating period of the project, surficial soils within land areas selected for mine and mill waste disposal will be mapped and characterized to determine availability and suitability of natural soil materials for covering waste disposal dumps.

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PRELIMINARY SPILL PREVENTION, CONTROL AND COUNTERMEASURES PLAN

RED DOG PROJECT

Prepared By:
COMINCO ALASKA

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55

PREFACE

This report is preliminary in nature. It is based on the level of conceptual engineering design detail necessary to establish capital and operating costs only for financial feasibility. Operatin details are based on concepts developed from experience at other Cominco operations.

Final design details will develop more optimum solutions to some of the problems discussed herein. The actual mine operating personnel assigned during the final detail design of the project will be charged with the responsibility of developing an operating management practices manual which may alter some of the details of this SPCC plan.

The general philosphy and commitment by Cominco as a responsible coperate citizen to ensure a minimal disruption to the environment will not change upon finalizatio of this SPCC plan.

1. INTRODUCTION

The proposed Red Dog mining project will produce lead, zinc and barite concentrates from mined ore and consume various chemicals as mill process reagents. In addition, substantial volumes of fuel will be used for electric and mature power generation. The port facility will receive and trans-ship fuel on behalf of the Nana Region villages. Handling and storage facilities will be designed to prevent accidents and spills. However, spills of all of these commodities, although remote, can cause detrimental environmental impacts which in, the case of certain chemical reagents, may be acute. The issue of personal safety is of paramount importance in all operations involving these materials.

Notwithstanding Federal and State requirements, it is incumbent upon the project to plan and implement procedures which will minimize the risk of spills and to prepare practicable and effective countermeasures. Such planning must necessarily integrate both the resources and liabilities in the project components in terms of personnel, equipment and the environmental setting. It is a basic principle that these objectives are consistent with good engineering and operating practices.

1.1 Purpose

This report presents Cominco Alaska's plan at the feasibility level for the prevention and control of chemical, oil and concentrate spills which may emanate from components of the Red Dog operations. It is important to recognize that the comprehensive specification of materials management and spills control procedures can only be completed when detailed engineering is substantially complete and materials procurement is underway. It is proposed that the final selection of specific countermeasures resources be made in consultation with the appropriate State and Federal agencies.

The planning documented herein is based on the project alternatives which include the offshore island (ballasted tanker) as a part of the port facility).

1.2 Statement of Policy

The following are key elements of Cominco Alaska's policy with respect to spills prevention and control and environmental protection in general:

- To comply with all existing State and Federal regulations.
- To provide additional environmental protection measures where warranted that are technically feasible and economically viable.
- To encourage, support and conduct research to establish high standards of performance and to improve methods for environmental control.
- To anticipate future pollution control requirements and to make provision for them in long range planning.
- To keep employees, agency personnel and the general public fully informed concerning all environmental aspects of company operations.
- In all emergency situations, in order of priorities are: personal safety, environment, property and production.

2. MATERIALS QUANTITIES AND PROPERTIES

2.1 Concentrator Reagents

The chemical reagent requirements for Red Dog have been established from a comprehensive program of metallurgical testwork. There are no feasible alternatives to these materials which may be applied without incurring losses of the valuable minerals to tailing, or inferior concentrate grades. All are in safe use in similar base metal concentrators around the world and there is ample experience upon which to base effective management procedures and facilities design.

Table 2.1 provides the quantities of reagents to be used in the initial production period and an estimate of the requirements when concentrate production will be expanded in about year six of the operation.

Table 2.1

Red Dog Concentrator Reagents

	Initial Production tons/year	Initial Production tons/year
Zinc sulfate (ZnSO4)	529	982
Copper sulfate ($CuSO_4$)	529	982
Sodium cyanide (NaCN)	106	197
Methyl isobutyl carbinol (MIBC)	53	98
Sodium isopropyl xanthate (NaIPX)	529	982
Sodium cetyl sulfonate (EC-111)	79	79
Sulfuric acid, 93% (H_2SO_4)	1,057	1,962
Hydrated lime (($CaOH)_2$)*	4,182	6,553
Polyacrylamide flocculant (Percol 730)*	6	6

*NOTE: Part of the lime and all of the flocculant will be used in the wastewater treatment process.

In zinc and copper sulfates are slightly acid, water soluble salts which will be used as conditioners in flotation. These materials will be shipped in bulk, 2,000 lb. capacity, reinforced plastic bags and can be compatibly sorted together.

Sodium cyanide is a water soluble and toxic reagent which must be stored and handled in isolation from other chemicals, particularly those which are acidic in nature. It is commonly supplied in lump form and will be shipped in 2,000 lb. capacity plastic bags. This reagent has been proven to be essential to the metallurgical process as a depressant of iron minerals and cannot be substituted by potential alternatives such as sodium sulfite.

Methyl isobutyl carbinol is a flammable alphatic liquid alcohol which is lighter than and has only a modest solubility in water. This material will be shipped in 400 lb. capacity steel drums and can be safely stored with the other chemicals. It will be used as a frothing agent in flotation.

The sodium isopropyl xanthate is an essential sulfide mineral collector in the flotation process. It will be shipped as pellets in 2,000 lb. capacity plastic bags which are preferably stored apart from acidic materials.

Sodium cetyl sulfonate is a paste-like surface active agent used for barite flotation that has only a moderate solubility in water. It is essentially non-toxic and has been approved for use in food applications. It will be shipped in 400 lb. capacity steel drums.

Sulfuric acid will be shipped and stored in bulk tanks. Although the concentrated 93% acid form does not attack mild steel in normal conditions, it should be generally regarded as being corrosive and great care is required in materials selection. It is necessary in the process to ensure that the zinc concentrate has a sufficiently low silica concentration to be marketable.

Lime will be used as a pH modifier in flotation and as a neutralizing agent in the wastewater treatment plant. It is moderately water soluble and only toxic in concentrations which result in high alkalinity. In the hydrated form, it is relatively safe to manage and will be shipped in 2,000 lb. capacity plastic bags.

The flocculant (Percol 730) is a slowly water soluble, high molecular weight, acrylamide-based polymer that will be used as a solids settling aid in the wastewater treatment plant. This material is relatively non-toxic. It will be shipped in 50 lb. sacks on pallets and must be protected from temperature extremes in storage.

2.2 Reagent Shipping Containers

With the exception of the liquids, it is planned that all reagents be supplied and handled in the semi-bulk plastic bag containers. This form of packaging is becoming very widely used instead of the more traditional forms including fibre and steel drums and polylined sacks. The advantages offered by the large bag containers are:

- more reliable protection and control of the contained materials,
- improved economy in both purchase costs and handling operations,
- elimination of disposal problems (containers are re-used up to about 100 times),
- storage areas are minimized.

The bags are completely integral units and come equipped with fittings for bottom discharge into system hoppers and reinforced rigging accessories for loading and transport by cranes and forklifts. Typical properties of a suitable reagent bag material are provided in Table 2.2.

Table 2.2

Properties of Reagent Container Material

Material - PVC Coated Polyester Fabric
Thickness - 1.00 ± .05 mm
Weight - 1,130 ± 100 g/sq. m.
Breaking strength, 3 cm. strip - Warp 150 Kg, Fill 150 Kg
Ultimate elongation - Warp 25%, Fill 30%
Hydrostatic resistance, 3 min. - +3,000 g/sq. cm.
Flexure resistance (Scott type test) - Fine 1 Kg 1,000 times
Low temperature - Satisfactory handling to -40°C
Thermal resistance - No damage to 70°C
Chemical resistance - Excellent with both 10% NaOH and 10% H_2SO_4

2.3 Concentrates

The lead and zinc concentrates to be produced at Red Dog are essentially the sulfides of the respective metals accompanied by minor amounts of other metal sulfides and gangue impurities. For example, the zinc concentrate will typically assay 59.0% Zn, 3.7% Fe and 2.2% Pb while the lead concentrate will contain 62.5% Pb, 7.4% Fe and 8.0% Zn. The moisture contents will be about 7-8% and the various flotation reagents will be present in the form of surface complexes bound to the solids. The individual particles have a high specific gravity (Pbs 7.5, ZnS 4.1) and they will virtually all be less than 400 mesh in size.

In terms of basic chemical properties, the concentrates are relatively inactive in comparison to the corresponding metal sulfates. Being largely inert, they are not immediately a threat to biological organism in situations where discharge to the environment may occur. Strong supporting evidence for this fact is provided by experience in concentrators where the biological monitoring of workers exposed to airborne metal sulfides is conducted. Blood lead values are low in these situations and no health problems are encountered. Apparently, the stability of metal sulfides can permit their intake and clearance from organisms without appreciable biological accumulation.

The barite to be produced is essentially water insoluble and is regarded by chemists as being chemically inert. In fact, as a mitigative measure in dealing with spills of the soluble barium salts, conversion to the barite form ($BaSO_4$) is a recommended technique. The Red Dog material will be about 90% $BaSO_4$, containing silica (SiO_2) and minor concentrations of heavy metals as impurities. It will be dried in the concentrator to essentially zero moisture content before shipment. The concentrate production capacities are given in Table 2.3 as follows:

Table 2.3

Red Dog Concentrate Production, tons/year

	Lead Concentrate	Zinc Concentrate	Barite
Initial Production	79,000	350,000	50,000
Expanded Production	119,000	585,000	50,000

It should be noted that the barite production capacity is as noted above, and the actual quantities produced in any given year may be substantially less, and vary with market demand.

All handling and shipping operations of the lead and zinc concentrates will be in the bulk form. Barite will be packaged in the recycleable, plastic bag-type containers identical to those used for reagents.

2.4 Fuel Requirements

Red Dog operations will annually require about 5.5 million gallons of No. 1 grade diesel fuel for electric power generation. This quantity will increase to an excess of 7.0 million gallons when production is expanded in about year six. In addition to diesel, a relatively small supply of jet fuel and aviation gasoline will be maintained at the mine site, primarily for emergency purposes.

Typical specifications of the "Arctic Diesel" fuel to be used are given in Table 2.4.

Table 2.4

Typical Fuel Specifications

Gravity °API	-	40.0
Flash Point, °C	-	48
Viscosity @ 40%C, cSt	-	1.4
Pour Point, °C	-	50
Cloud Point, °C	-	46
Sulfur, mass %	-	0.11
Sediment and water, Volume %	-	.05
Ash, mass %	-	.01
Cetane number	-	45
Btu per gallon	-	134,700
Distillation end point, C	-	282

3. MATERIALS TRANSPORTATIN AND DEPORTMENT

This section considers the transport and storage logistics of chemical reagents, concentrates and fuel as a basis for subsequently evaluating spill prevention and control. The three elements within the overall system are the port, road and mill site. Within the port and mill there are, naturally, sub-elements which consist of discrete handling and/or comsumption operations.

3.1 Port

The receiving of general supplies, oil and chemical reagents and the shipment of concentrates will be during the open water season which normally runs from early July to the end of October. These operations, as well as the major storage of all materials will be at the port complex illustrated in Figure 3.1. The three major facilities in the complex are the deep water dock, the shallow water dock and storage area and the concentrate storage building located 2.5 miles inland.

The deep water dock will be a modified ice-strengthened 250,000 DWT tanker permanently ballasted in 35 feet of water about 4,000 feet from the shoreline. Figure 3.2 illustrates the general configuration of the vessel and its material handling system. It will have the capacity for storing up to three months of concentrate production and 9.4 million gallons of fuel (initial requirement 5.5 million gallons). A 1,000 ton capacity lightering barge will transport supplies and concentrates to or from the shore during the open water season.

The shallow water dock is a reinforced earth-fill causeway some 400 feet in length having a sheet pile face. This facility also includes chemical reagents and supplies storage, a fuel transfer facility, a small accommodation complex and ancillary support facilities.

The main concentrate storage capacity for 8.5 months production will be in a long building 2.5 miles from the coast. Trucks will either dump (from the mill) or load (to the dock) within the building and a tracked loader will be used for pile construction or reclaim.

C5

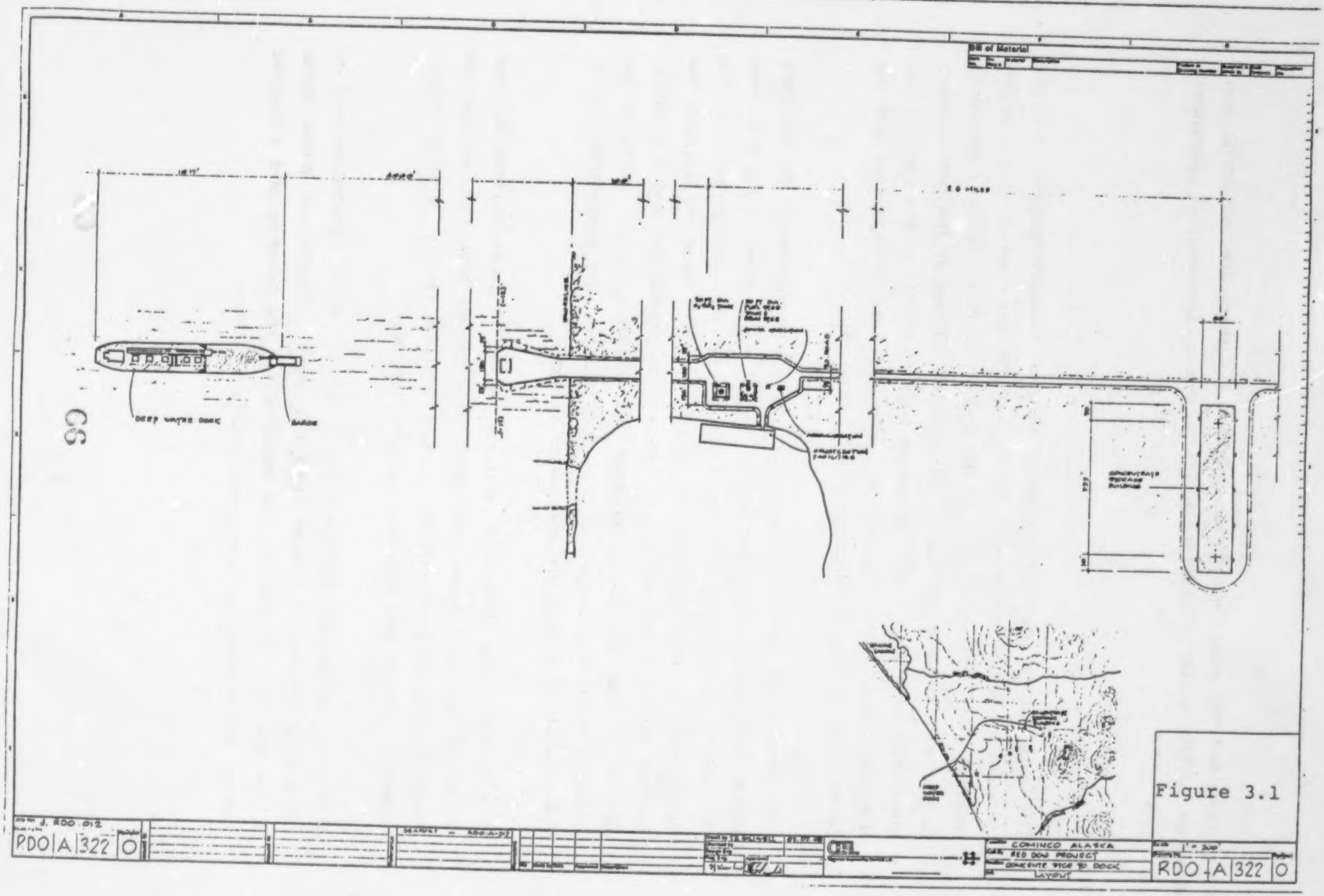
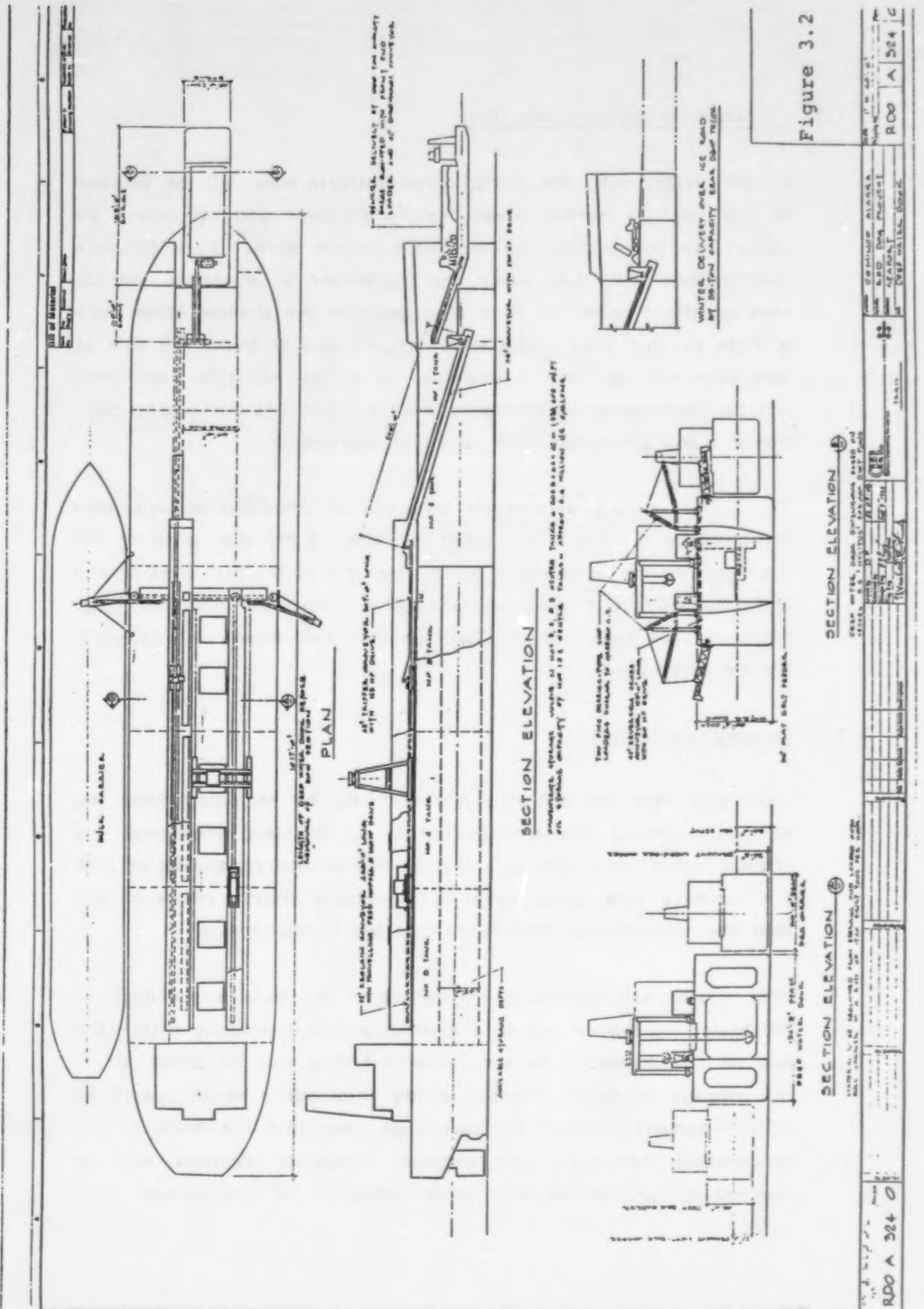

1817'
DEEP WATER DOCK
BARGE
Bill of Material
COMINCO ALASKA
RED DOG PROJECT
CONCENTRATE PIPE TO DOCK
LAYOUT
1" = 200'
RDO A 322 0
J. RDO 012
RDO A 322 0

Figure 3.1



PLAN
SECTION ELEVATION
SECTION ELEVATION
SECTION ELEVATION
RDO Dmg Project
Deep Water Dock
RDO A 324 0

Figure 3.2

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3.1.1 Concentrator Reagent Handling

All chemicals, with the exception of sulfuric acid, will be shipped to the port in normal ocean freight carriers and off-loaded by crane into the lighter for transport to the dock. Forklift/truck combinations will then place the containers in a secure storage area on the side of the wide road between the shallow water dock and its service area. The small reagent lots of about 100 tons or less each will be directly transported to the mill site. Materials will be segregated according to the requirements outlined in Section 2.1 and protected from vehicular movements.

The annual supply of sulfuric acid will be provided in on ocean-going barge or ship. An 1,800 ft. long, 6 in. dia. pipeline will then convey the acid into a 30 ft. high by 30 ft. dia. heat traced and insulated mild steel storage tank. An acid resistant lined berm of 110% tank capacity will provide contingency containment around this vessel.

3.1.2 Concentrate Shipment

Lead and Zinc concentrates will normally be reclaimed from the storage building and transported to an enclosed area near the shallow water dock face in a tractor drawn unit consisting of 2-75 ton capacity side dump boxes. A portable shuttle conveyor will load the concentrates from there into the lighter barge.

This vessel will discharge its cargoe to the deep water dock as illustrated in Figure 3.2 at a location which is actually within the bow of the ballasted tanker. Concentrates will be conveyed to the storage holds or directly to the shiploaders which are fitted with "elephant trunks" for discharge deep into the holds of the concentrate carriers. All exposed conveyor systems will be covered to protect against wind transport of concentrate particles.

3.1.3 Fuel Storage

Two center tanks of the deep water dock, protected by reinforced wing tanks, will receive the annual fuel supply from an ocean-going tanker. Fire protection for this storage will be provided and the status of the tanks will be monitored by instrumentation.

Fuel will be pumped to a shore-based 50,000 gallon transfer week at an average rate of approximately 100,000 gallons per week. The undersea fuel line will consist of a 4 in. dia. Schedule 40 steel line set inside a 6 in. dia. Schedule 40 line which will be in a backfilled trench in the sea bottom. The entire shore-based fuel facility, with the exception of dispensing lines will be set in a lined berm of 110% tank capacity and protected by appropriate security and fire suppression measures.

3.2 Transportation

An overall perspective of all material movements required for the operation is provided in Figure 3.3. The haulage of mine waste and ore is included in the figure but this issue is outside the scope of this report. It gives an effective summary of the transportation schedules and vehicle types used between the mill and the port site, with the latter assumed to be at VABM 28. The road considered is that along the shortest route (56.7 miles) passing through the Cape Krusenstern N.M. This alignment is illustrated in Figure 3.4.

The road will be gravel surfaced, of 30 ft. nominal width and constructed almost entirely of fill. Passing places of 50 ft. width will be provided every two miles and the maximum grade is 4%. Five bridges are required varying in length from 50 to 160 feet. Culverts will be constructed in 122 stream and watercourse crossings with an additional 60 installed to handle spring runoff.

C9

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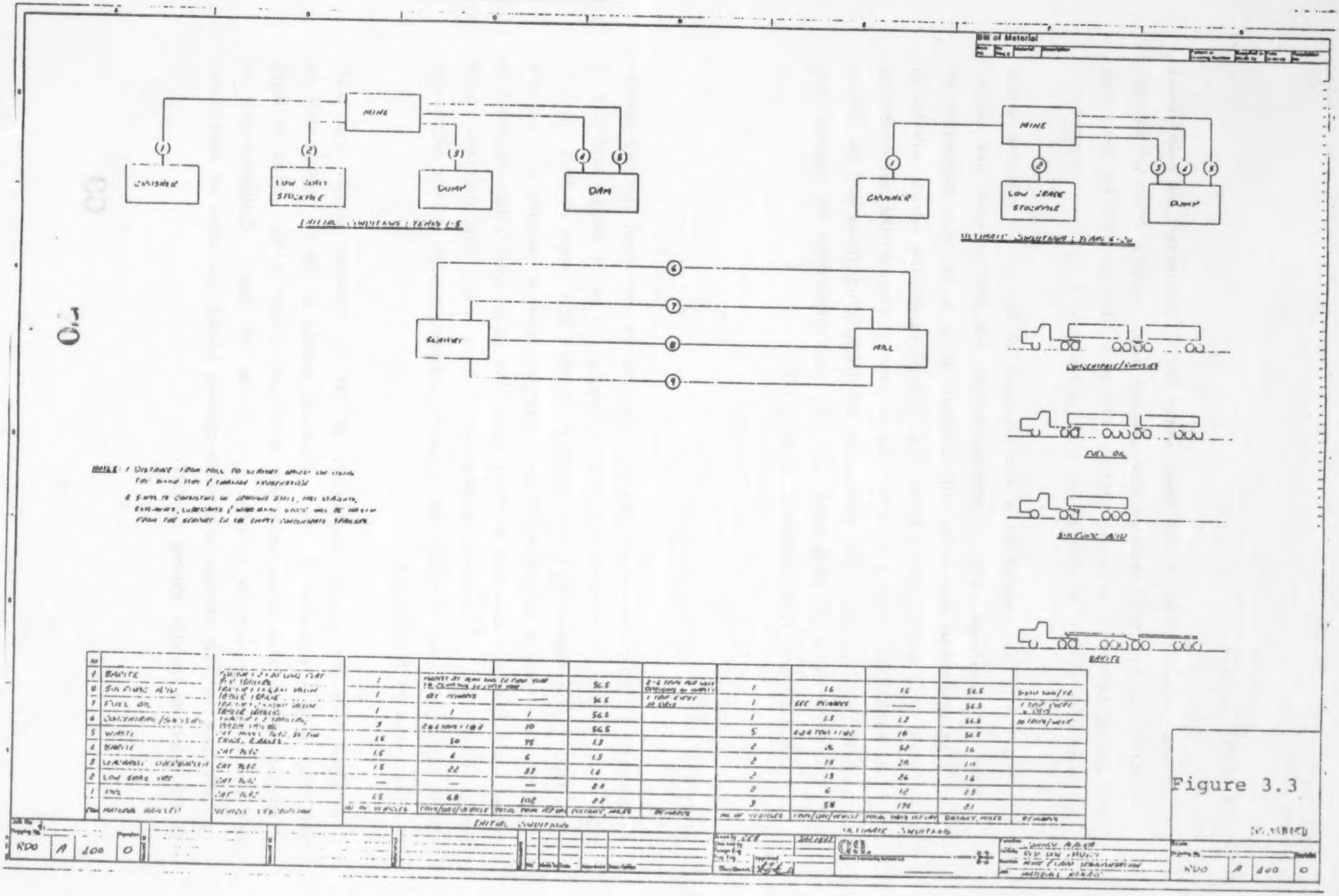
MINE
(1)
CRUSHER
(2)
LOW GRADE STOCKPILE
(3)
DUMP
(4)
(5)
DAM
INITIAL CONDITIONS : YEARS 1-5
MINE
1
CRUSHER
2
LOW GRADE STOCKPILE
3
4
5
DUMP
ULTIMATE CONDITIONS : YEARS 6-20
6
7
8
9
SCHEMY
MILL
CONCENTRATE/SUPPLIES
FUEL OIL
SULFURIC ACID
BARITE
NOTES
Bill of Material
RDO
A
400
0

No.	Material Hauled	Vehicle Description	No. of vehicles	Trips/day/vehicle	Total trips per day	Distance, miles	Remarks	No. of vehicles	Trips/day/vehicle	Total trips per day	Distance, miles	Remarks
9	BARITE	[illegible]	1	[illegible]		56.5	[illegible]	1	16	16	56.5	[illegible] tons/yr.
8	SULFURIC ACID	[illegible]	1	SEE REMARKS	—	56.5	1 trip every [illegible]	1	SEE REMARKS	—	56.5	1 trip every [illegible]
7	FUEL OIL	[illegible]	1	1	1	56.5		1	1.8	1.8	56.5	[illegible] trips/week
6	CONCENTRATE/SUPPLIES	[illegible]	3	[illegible]	10	56.5		5	[illegible]	18	56.5	
5	WASTE	[illegible]	15	50	75	1.3		2	26	52	1.6	
4	BARITE	CAT 769C	16	4	6	1.3		2	14	28	1.0	
3	[illegible]	CAT 769C	15	22	33	1.4		2	13	26	1.6	
2	LOW GRADE ORE	CAT 769C	—	—	—	2.4		2	6	12	2.3	
1	ORE	CAT 769C	15	68	102	2.2		9	58	174	2.1	
			INITIAL CONDITIONS					ULTIMATE CONDITIONS				

Figure 3.3

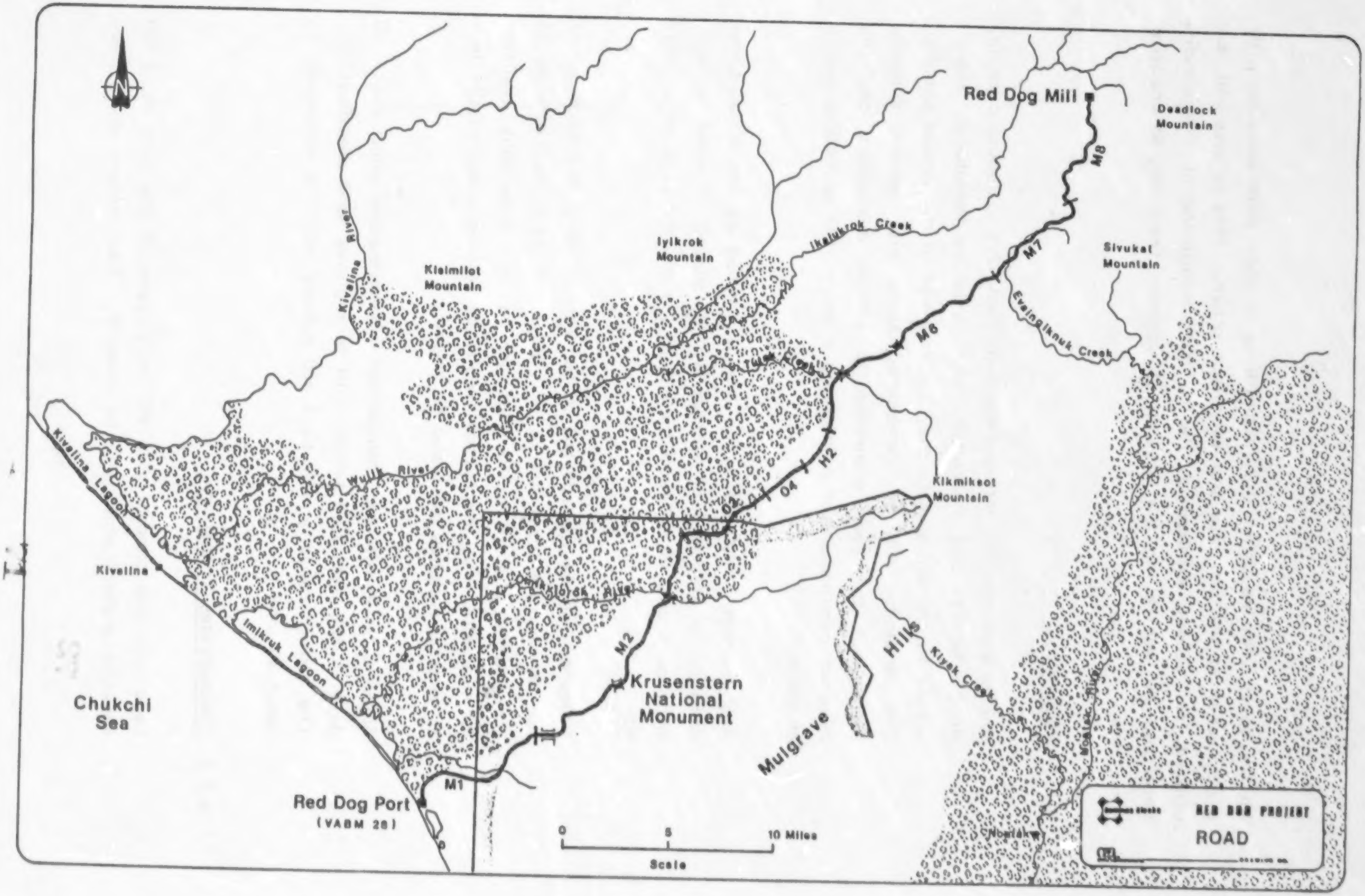
Red Dog Mill
Deadlock Mountain
M8
M7
Sivukat Mountain
Ikalukrok Creek
Iyikrok Mountain
Kisimilot Mountain
Kivalina River
Evaingiknuk Creek
M6
H2
04
02
Kikmikeot Mountain
Wulik River
Kivalina Lagoon
Kivalina
Imikruk Lagoon
Chukchi Sea
M2
Krusenstern National Monument
Mulgrave Hills
Kiyak Creek
Noatak River
Noatak
M1
Red Dog Port
(VABM 28)
0
5
10 Miles
Scale
RED DOG PROJECT
ROAD

Figure 3.4

All transport vehicles using the road will be in radio communication with a dispatcher at the mill site and with each other. This service will be utilized for schedule monitoring, the constant monitoring of road conditions and for controlling the passing of vehicles travelling in opposite directions.

3.2.1 Reagents Transport

The smaller reagent lots indicated in Table 2.1 including cyanide, MIBC, EC-111 and flocculant, will likely be immediately transported to the mill site as they are received in the annual sea lift. The remainder will be transported along with general supplies throughout the year according to vehicle availability and the minimum requirement of maintaining a three week operating supply at the mill.

Any reagent containers which are determined by inspection to be damaged in shipment or storage will be placed in spare containment bags and immediately hauled to the mill for contents utilization.

Reagents will be transported to the mill utilizing the backhaul of the concentrate transport units. Bags will be placed directly in the trailers and up to 10 trips per day are potentially available for reagents, but the normal frequency will be substantially less as general supplies must also be moved.

Sulfuric acid will be transported approximately once every 10 days in the dedicated tanker unit of highway acid specifications. The tanker capacity will be 6,400 gallons which is equivalent to about 49 tons.

3.2.2 Concentrates Transport

Lead and zinc concentrates will be shipped to the port in 75 ton capacity trailers which will be covered. Two trailers and a tractor will make up one unit and 10 trips per day will normally be necessary during the initial production period.

Barite shipments in bags will be on flat bed trailers or in the concentrate trailers depending on the availability of the latter. The frequency will be 2-6 shipments per week depending on market conditions which are evident when the operation is started.

3.2.3 Fuel Transport

Fuel will be shipped to the mill site in units consisting of two 10,500 gallon capacity trailers. Supply maintenance will normally require one round trip per day.

3.3 Mill Site Materials

The major handling of all reagents, concentrates and fuel will center in and around the mill complex illustrated in Figure 3.5.

3.3.1 Reagents Utilization

All storage of chemicals at the site will be in the concentrator building in accordance with the previously outlined requirements for segregation, particularly as they apply to sodium cyanide. The method of handling solid reagents will be initial dissolution in solution preparation tanks, followed by transfer to stock tanks from which the solutions are dispensed to various points in the process in clearly identified lines. Cyanide handling will be done in a secure enclosed area within the wastewater treatment building, that is isolated from all other reagents.

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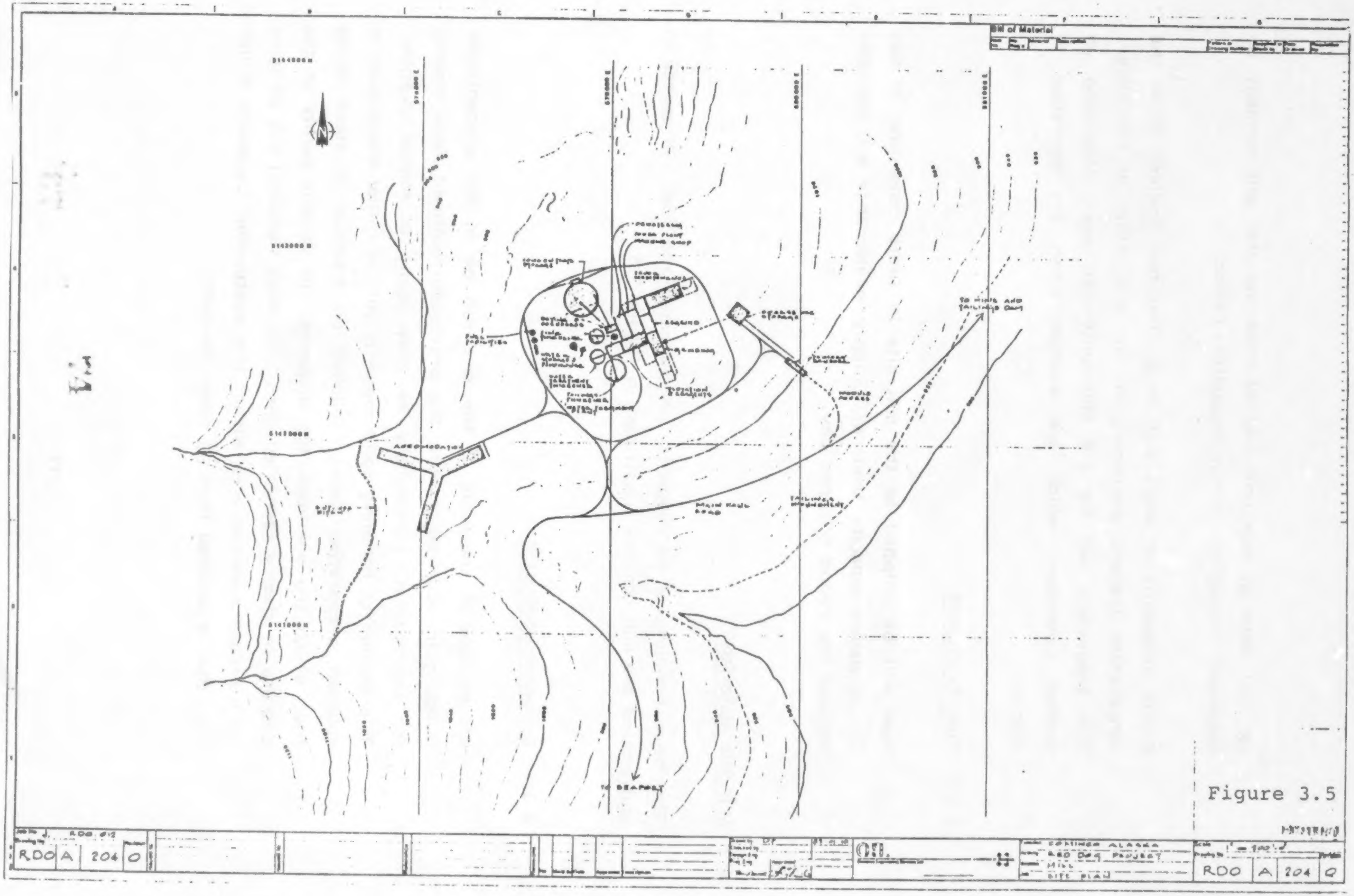
Bill of Material
ACCOMMODATION
MAIN HAUL ROAD
TAILINGS
TO MINE AND TAILINGS DAM
TO SEAPORT
COMINCO ALASKA
RED DOG PROJECT
MILL
SITE PLAN
1" = 100'-0"
RDO A 204 0

Figure 3.5

MIBC will be directly applied from drums by metering pumps and sulfuric acid will be used directly from a bulk storage tank of about 7,000 gallons capacity. This vessel will be protected in a similar manner to the larger storage tank at the port.

The basement of the general reagents preparation area will be confined separately from that serving the process section of the concentrator. Solution spills will be collected in a sump and returned to the appropriate stock tank.

3.3.2 Concentrates Production and Storage

Lead and zinc concentrates recovered in slurry form from flotation cells will be pumped to their respective thickeners which are external to the main concentrator building. Large sumps will collect minor spills and be used to contain the entire content of these vessels in the event they have to be emptied for maintenance. Concentrates collected in these sumps and process spills within the concentrator building will be returned to the process. Thickened concentrates will be pressure filtered and dried to a moisture content of 7-8% and conveyed to concentrate storage buildings which have a design capacity of six weeks production. Transports will therein be loaded and the trailers covered with a heavy roll-up tarpaulin before being dispatched to the storage facility at the coast.

Barite will be processed in a similar manner with the exceptions that it will be dried to essentially a zero moisture level and bagged, with up to six weeks production being stored beneath the dewatering section of the plant.

3.3.3 Fuel Storage and Distribution

A 200,000 gallon tank near the mill will provide the main fuel storage for the power plant and mobile equipment at the site. In addition, there will be a 50,000 gallon emergency supply tank located adjacent to the accommodation complex. A 15,000 gallon tank will be located at the airstrip to store jet fuel, but the actual volume maintained will be determined by experience during the initial period of operation. A small supply of aviation gasoline in drums for the emergency refueling of light aircraft will also be stored in this location. All tanks and ancillary pumping facilities will be protected by lined berms providing a containment volume equalling 110% of tank capacity.

All external fuel distribution lines will be located in above ground utilidors. Those which are in the mill complex will be isolated from all other process and service lines.

4. ADMINISTRATIVE SPILL PREVENTION AND CONTROL PROCEDURES

Comprehensive and detailed programs to prevent spills and minimize their environmental impacts will be implemented before the start of operations and, specifically, during the detailed design of the project facilities. In addition to ensuring the implementation of sound technical and engineering practices, these will include the establishment of administrative procedures for materials management and spills control. It is obvious that these must address the regulatory requirements of the U.S. Environmental Protection Agency, U.S. Coast Guard and the Alaska Department of Environmental Conservation. In addition, however, the security of operations and personal safety are issues of particular importance in view of the realities of location and climate.

4.1 Materials Management

Responsibility for this function will be charged to a Materials Management Committee under the direction of the Manager or his assistant. Key personnel will include the Mill Superintendent (reagents, concentrates), Maintenance Superintendent (fuel, transportation), Chief Storekeeper and the Fire Chief who will be in charge of security and safety. Other personnel with specific responsibilities such as the Environmental Technician and the Training Officer will be called upon to support this group from time to time.

Important taks of this Committee shall include:

Inventory Control - The maintenance and review of accurate records of the department, and consumption or production of all chemicals. Concentrates and fuel-loss detection and response planning are specific objectives.

Security - The provision of effective devices and procedures to protect materials in storage and to ensure access to these by only authorized and trained personnel is essential to spill prevention. The Committee will also review housekeeping issues and implement appropriate inspection schedules.

Training - Training manuals will be prepared and programs of instruction conducted. These will focus on the hazards of various materials and procedures for their safe handling and use. Particular attention will be given to mill reagent operators and those responsible for transportation and the various handling operations.

Emergency Response Procedures - The Committee will regularly review emergency response procedures in the light of operating experience and changine risks. These will be optimized and countermeasures equipment changed as required. An additional duty will be the investigation of spills or near spills which involve a threat to the environment or personal safety.

Appropriate response teams will be delegated and trained in accordance with the potential location of a spill and the material involved. All spill response co-ordination will be done by the Fire Chief. The logistical aspects of the operations dictate more than just a central response team.

4.2 Documentation and Notification

It will be the policy of Cominco Alaska to document all material spills whether or not they result in external discharge and environmental impairment. These will be filed with the Manager for regularly scheduled revies by the Materials Management Committee. Information to be promptly compiled in the event of a spill shall include:

- Specific location of spill.
- Date and time of spill.
- Ambient conditions at location.
- Specific material and estimated quantity.
- Apparent cause.
- Nature and extent of environmental contamination.
- Proportions of material contained and lost.
- Hazards to personnel, injuries.
- Specific countermeasures employed.
- Disposition of spilled material.
- Clean-up procedures implemented and date of completion.

Notification of spills with at least the potential for environmental impact will be promptly made to EPA, ADEC and the Coast Guard (river or marine situations). If, in the judgement of the Manager, major impacts are possible or external assistance with countermeasures is required, these notifications will be done immediately. The village of Kivalina and the Nana headquarters will also be immediately advised and briefed in the event of a major spill at the port or one which might severely threaten the Wulik River.

The agencies will be notified in advance of any planned changes in the nature or quantities of the materials utilized or produced at Red Dog.

This will also apply to the systems required for the handling and storage of material.

5. COUNTERMEASURES EQUIPMENT AND MATERIALS

The detailed specification of resources which will be available solely for spills control is not possible at this time, but will be done in the procurement phase of the project. However, a preliminary indication as to the nature and scope of the proposed capabilities can be given. It is planned that EPA, ADEC and the Coast Guard be consulted to ensure that the resources finally selected conform with regulatory requirements and optimum technology which is available at the time.

5.1 Mobile Equipment

A detailed list of mobile equipment to be available at the mine and port sites is presented in Table 5.1. This equipment will be used for spills control according to the order of priorities stated in Section 2.1.

5.2 Aircraft

No aircraft will permanently be maintained at the site but light aircraft and helicopters will be available from Kotzebue which is less than one hour flying time away. A 5,000 ft. long runway at the mine and a heliport at the port site will be available for emergency transportation purposes. Large cargo loads of countermeasures equipment can be brought in by Hercules or similar aircraft from Anchorage or other points in the south.

Table 5.1

Mobile Equipment Available for Spills Control

Mine Site	Size	Typical Unit
3 Front End Loaders	7 cu. yd.	Cat 988B
1 Front End Loader	1/2 cu. yd.	Low Profile
2 Tracked Dozers	410 HP	Komateu D355A
2 Tracked Dozers	200 HP	Cat D7
1 Wheeled Dozer	310 HP	Cat 824C
3 Road Graders	180 HP	Cat 146
1 Hiab Truck	3 ton	--
a Water/Gravel/Sand Truck	5 ton	Kenworth
1 Lowboy Tractor/Trailer	--	--
1 Snowblower	--	--
1 Snowplow Truck	15 ton	V-blade Kenworth
1 Crane	20 ton	Mobile-Rought Terrain
2 Buses	82 passenger	Bluebird
8 Pick-up Trucks	1/2 & 3/4 ton	4 Wheel Drive
1 Fire Truck	1,000 gallon	4 Wheel Drive
3 Forklifts	4,000 lb/6,000 lb	Diesel
1 Service Truck	3 ton	--
4 Haul Trucks	150 tons	Kenworth Truck & 2 Trailers

Port Site	Size	Typical Unit
1 Forklift	6,000 lb.	4 Wheel Drive
1 Crane	20 ton	Mobile-Rough Terrain
1 Front End Loader	7 cu. yd.	Cat 988B
1 Front End Loader	4 cu. yd.	Cat 966B
1 Tracked Dozer	200 HP	Cat D7
1 Tracked Loader	3 1/4 cu. yd.	Cat 977C
2 Pickups	3/4 ton	4 Wheel Drive
3 Fuel Oil Trailers	10,500 gallon	Fruehauf
1 Acid Trailer	6,400 gallon	Fruehauf
8 Flat Bed Trailers	40 ft.	Fruehauf
1 Load Lugger	--	--
4 Tractors	--	--
1 Crane	50 ton	Mobile-Rough Terrain
1 Container Forklift	20 ton	Taylor TY 520M

5.3 Communications

5.3.1 Port Site

Radio - Air-to-ground and marine VHF radio systems to maintain communications with inbound and outbound ships and aircraft. A small "seaport services" system for operational personnel and vehicles at the port.

Telephone - a small PABX (8 lines) system to provide public network access to key locations at the port.

Status Monitoring - a 12 channel telemetry system for monitoring the status of major storage tanks from the mine site.

5.3.2 Mine Site

Seaport Mine Link - A UHF radio link to provide a multi-channel facility to support telephone and analog telemetry systems.

Transportation System - A VHF radio repeater system to provide reliable communications to haulage vehicles from the mill complex and seaport.

Mine/Mill System - A VHF radio repeater system to provide communications between the operating offices, mobile units and mine/mill and service personnel using protable radios.

HF Marine - HF radio including antenna and towers system to provide communications to ships associated with the seaport.

Deadlock Mountain Site - A site facility to support the various radio systems associated with Red Dog operations.

5.4 Chemical Spills Control

The on-site equipment available would be essentially that on the mobile equipment list supplemented with various hand tools and portable pumps for reclaiming spilled sulfuric acid. Spare reagent containers will be maintained for repackaging those damaged in shipment or handling.

Lime is available, both as a countermeasure and restorative agent, for dealing with acid spills. The bag containers will be fitted for bottom discharge and the material can be readily dispensed from either cranes or helicopters. The use of available sulfuric acid to neutralize lime spills will not be conducted as this countermeasure would pose risks greater than those associated with the lime spill.

A supply of either calcium hypochlorite or sodium hypochlorite will be maintained at both the port and mill sites to combat the effects of sodium cyanide spills. No decision has yet been made on which material to select. The calcium salt has a long shelf life but it is in a granular form that is difficult to apply. The sodium salt is in a solution form but has a shorter shelf life and requires a greater weight over the calcium salt for the equivalent cyanide oxidizing capacity.

5.5 Concentrates Spill Control

The on-site equipment available for cleaning up spilled concentrates would be that on the mobile equipment list. In the unlikely event of a vessel sinking (i.e. lighter barge), special slurry reclaim pumps suitable for marine applications are available from another Cominco operation.

5.6 Oil Spills Control

As indicated previously in this report, the selection of equipment specifically for oil spills control will be made later in the project development

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and with agency consultation. However, it is recognized that oil spill control equipment will be essential in an effective countermeasures plan, this information will be presented in the Final SPCC Plan.

6. SPILLS RISK AND CONTROL

6.1 Port Site

An obvious risk factor which could contribute to spills of all material at the port during handling operations is the weather. In order to minimize this risk it is essential that the operation take advantage of all possible aids in obtaining accurate forecasts of weather and sea conditions in order to schedule loading and unloading activities. A clear set of directives governing the curtailment of operations during difficult weather is also vital.

6.1.1 Reagents

Container security discussed in Section 2.2 will be an effective preventive measure in preventing the spills of chemicals. Cargoes will be inspected prior to unloading from supply ships to ensure that damaged containers are repackaged prior to being transferred to lighters. Secure rigging and crane operation practices will prevent the accidental discharge of containers to the sea.

If discharged to the sea, several of the chemicals have bulk densities less than that of water and these containers will float. Divers would be brought in to assist in the underwater recovery of sunken containers. Since the containers are waterproof, either situation should not result in marine contamination provided that they remain intact. There are no feasible containment or recovery procedures which may be applied if reagents are in direct contact with seawater.

In the unlikely event of a reagent spill in the sea, short-lived impacts on marine life in the immediate vicinity will occur but should dissipate quickly.

The prevention of spills on shore will be effected by the implementation of careful security in storage and safety with vehicle movements. The materials in segregated storage will be inspected at regular intervals and damaged containers immediately transported to the mill for the use of the contents. Under no circumstances will the handling of reagent containers be permitted if ambient temperatures are less than the safe level specified by the manufacturer.

Acid will be directly unloaded at the shallow water dock from an ocean-going barge. Spills prevention will originate in careful materials selection and continue with the regular inspection of all storage and handling systems. A check-list system will be implemented to protect against the improper operation of pumps and valves. The status of the acid storage tank will be monitored from the mill by telemetry and any major spill from this source will be contained by a berm lined with acid resistant material.

There are no mitigative procedures which can be applied if acid is spilled to the sea. Short term toxic impacts by virture of pH depression may be evident in the immediate vicinity of the spill. Small land spills at the port will be neutralized with lime and the contaminated soil excavated and transported to the mill for disposal in the tailings pond.

6.1.2 Concentrates

Potential origins of concentrate spills at the port are conveyor, shiploading, lighter and truck operations. Short of a major accident such as the sinking of a loaded lighter, most potential causes of spills would be relatively minor and of a poor operating or housekeeping nature.

Trucks will be covered and if rear dumps are used for haulage, tailgates will be tightly secured. All exposed conveyors will be covered to prevent the wind transport of concentrate particles and return belts will be cleaned to remove sticking material which could potentially fall in the sea. Conveyor transfer points will be enclosed housings which will be regularly cleaned out and systems will be interlocked. Shiploaders will be equipped with elephant trunks to direct concentrates deep into ships hold and prevent spillage on decks.

Minor losses to the sea are expected to be rapidly dispersed by the dynamic sea conditions at the VABM 28 site and to have negligible marine impacts. Spillage will result in some release of surface adsorbed flotation reagents and heavy metals but the sulfides will remain chemically intact and be inundated by normal marine sediments.

If major spills, such as those from a vessel sinking, are localized, every effort would be made to recover the materials using a slurry pump system. This utilizes a pump fitted with an agitator assembly that fluidizes consolidated material to a pumpable form.

6.1.3 Fuel

An essential feature of fuel spill prevention is the integrity of the deep water dock itself in the light of sea and ice conditions expected at the port. Storage will be in center compartments protected from the sea by two layers of steel. Prior to being permanently ballasted in a prepared bottom location, the outer hull will be ice strengthened by the addition of about 600 tons of new steel plate and about 200 tons of steel will be provided for additional bulkheads in the tanks. Approximately 95,000 cubic yards of gravel ballast will be used to permanently stabilize the vessel on the sea bottom.

Corrosion protection measures will be provided on the outer hull and an ice load monitoring system will be installed. Status monitoring of the fuel in storage will continually be conducted by instrumentation and the bilges between hull compartments will be routinely inspected.

Fuel transfers to the berm-protected shore facility using the undersea double line will be closely monitored. Flow detectors will be incorporated to warn of smooth transfer disruptions and leak detectors will be installed to sense fuel leakage in the space between the inner 4-inch and outer 6-inch line.

If spills to the sea are detected, containment and clean-up measures would be initiated using equipment available at the port. It is recognized that sea conditions could be such that containment is not practicable since boom effectiveness is limited. By the nature of the viscosity of diesel fuel, it is not expected that substantial long lasting beach accumulations would occur during high shoreward winds. Therefore, it is not proposed that the removal of contaminated beach material be a standard feature of clean-up measures. It is quite possible that this practice would cause more physical damage to beach systems than would result from the spilled oil itself.

6.2 Materials Transportation

The significant cause of potential spills during transportation are common to all materials handled. Driver error or carelessness is the predominant factor in major transportation accidents throughout North America and every effort must be made to eliminate this as an element of risk at Red

Dog. Comprehensive training and safety rules are essential and must be backed by strong management policies with respect to infractions and driver performance.

The road will generally be constructed according to standards employed on the North Slope. Impact engineered guard rail systems will be installed on bridges and the berming of approaches will be employed on a site specific basis if these do not constitute a greater safety hazard by trapping snow. Reflectors will be installed as road side markers.

Maintenance is a vital protective measure as it applies to both road and vehicle conditions. Base inspections and prompt surface repair will be conducted during the warmer months and will be particularly emphasized during the break-up period in the spring. Snow removal will be routine during winter, coupled with improvement programs to control drifting and troublesome locations. All haulage vehicles will be on fixed preventive maintenance schedules and their safety systems shall be inspected daily.

Vehicle collisions are a potential cause of material spills which can be eliminated by effective communications between drivers and dispatchers. Frequent contacts between drivers proceeding in opposite directions will permit scheduled vehicle passing at the prepared passing locations. At all times, trucks hauling reagents from the port will have the right-of-way over concentrate trucks from the mill. Frequent radio contacts will also serve to alert drivers during periods of rapidly changing road conditions and losses of contact will result in the dispatch of assistance followed by the deployment of appropriate spill countermeasures.

Once the road alignment is fixed and detailed design is underway reconnaissance of sensitive locations and stream crossings will be conducted to assist in the tactical planning of spill countermeasures appropriate to specific sites. For example, it would be impossible to contain a fuel spill at the point of a stream crossing, but there may be downstream locations of opportunity at which containment could be effected. These site assessments will also include planning for access vehicle types and routes.

6.2.1 Reagents

Under most circumstances in which accidents occur during transportation it is expected that the reagent containers will be of sufficient strength to remain intact or, at worst, suffer only minor ruptures with small losses. Where possible, the spill area will be isolated and the materials reclaimed for immediate use in the concentrator. Highly contaminated soils and muskeg or snow will be removed and disposed of in the tailings pond, and the site later revegetated. Areas where sodium cyanide spills result in ground contamination will be treated with hypochlorite. Sulfuric acid spills will be reclaimed where possible and the impacted ground area neutralized with lime. Reagent spills to watercourses will be dealt with by procedures to be developed in the site specific tactical planning. These will always involve the dispatch of the Environmental Technician and assistants with field analytical kits to establish the advance and extent of stream contamination. Consultation with the Alaska Department of Fish and Game will be immediately initiated if there appears to be a potential for impact on fish resources. Field data from watercourses and spill magnitude estimates will then be used to decide on appropriate countermeasures which could involve outside support such as helicopters.

Since containment of water soluble reagent spills in stream flows is not normally possible, specific countermeasures might include the broadcast application of lime from helicopters for mitigating acid impacts, or a similar use of hypochlorite for cyanide destruction. Such in-situ actions require effective field monitoring support, and careful control and would be initiated with agency approval.

6.2.2 Concentrates

There is the potential for a spill of up to 150 tons of concentrates in a single event. Lost materials would be reclaimed by mobile equipment appropriate to the site and either transported onto storage at the port or sent back to the concentrator for retreatment if the material is contaminated. Impacted soils and muskeg would be stripped and handled in a manner similar to that with reagent spills.

Since the concentrate particles have a high specific gravity and the chemical availability of the metal sulfides is low, significant detrimental impacts of spills on watercourses are not expected. Particles would rapidly settle out and appreciable accumulations could later be recovered by dredging with backhoes or other appropriate equipment.

6.2.3 Fuel

Fuel spills on land would initially be contained by appropriate ditches or berms and reclaimed into portable tanks by pumping and residues would be cleaned-up by the application of a loose sorbent such as peat moss. Contaminated soils and muskeg would be stripped and the contained fuel incinerated at the mill site.

The prior tactical planning would be most effective in managing fuel spills to watercourses. Appropriate countermeasures including booms, sorbents and ancillaries would be deployed at preselected downstream locations to intercept and recover spills.

6.3 Mill Site

The environment is most protected from material spills at this location by the integral nature of the operations. Through long established design and operating practices, concentrators contain internal facilities for spills management and materials recovery. Simply put, there is no physical possibility of spills being discharged from the concentrator building. A final line of defence is the tailings pond which would serve to trap all materials and contaminated runoff emanating from the entire mill area.

6.3.1 Reagents

The facilities to process reagents and contain spills have been previously discussed. Appreciable concentrations of these materials will not occur in tailings pond water since, by virture of their chemical properties, there is a vital requirement for carefully managed application in the process. They normally report almost completely to the concentrates with the balance remaining bound to residual sulfides in tailings. Overdoses in the process would be immediately reflected by upset conditions and, since about 85% water recycle from the tailings thickener will be practiced, continual optimum control will be essential.

6.3.2 Concentrates

Concentrator spills will be reclaimed by internal systems and the housing of storage areas and conveyor galleries will prevent the wind borne transport of these materials. Tailing will contain residual metal sulfide values but unacceptable losses to tailing could not be tolerated for economic as well as environmental reasons.

6.3.3 Fuel

Fuel spills from storage tanks will be contained by protective berms and the material consumed in the power plant. Distribution lines will be regularly inspected and minor leakages corrected immediately.

Fuel would be an unacceptable contaminant in the wastewater treatment plant but any present in the tailings pond water will normally report as a scum on the surface of the treatment clarifier. Any fuel present as a visible sheen will be recovered and disposed of by standard procedures for water borne spills.

BIOLOGICAL ASSESSMENT
# of the
Red Dog Mining Project's Potential Effects
on Endangered Species

Prepared Pursuant to
Section 7 of the Endangered Species Act
of 1973 (as amended)

Introduction

This Biological Assessment has been prepared in partial fulfillment of responsibilities under Section 7 of the Endangered Species Act. It is meant to complement the Red Dog Mine Project Environmental Impact Statement which provides a detailed project description (Chapter II) and description of the affected environment (Chapter IV). Information on threatened and endangered species is included in Chapter IV and in Chapter V, Environmental Consequences. The reader will find specific page references for each species addressed in this Biological Assessment in the EIS index (Chapter XIII).

Terrestrial Species

Based on information supplied by the U.S. Fish and Wildlife Service, the arctic peregrine falcon (Falco peregrinus tundrius) is the only listed endangered terrestrial species present in the study area. Additionally, several rare Alaska plants that are considered candidates for possible future listing as threatened or endangered have potential to occur in the area.

Threatened and Endangered Plant Species

According to Murray (1980), three candidate species have potential to occur in the area. The Kobuk locoweed (Oxytropis kobukensis), which is under consideration for endangered status, occurs along a 25-mile stretch of the Kobuk River on sand dunes. The kokrines oxytrope (Oxytropis kokrinensis) occurs in the western Brooks Range on dry alpine slopes, ridge crests, and fellfields. Erigeron muirii has been located on dry slopes northwest of the project area near Cape Thompson. Both of these species are under consideration for threatened status. Walpole poppy (Papaver walpolei), considered previously to be threatened, is no longer under consideration for protected status (U.S. Fish and Wildlife Service 1980). This species occurs on coarse, well-drained soil in the lower Noatak and middle Kobuk Rivers.

Of these plant species, the kokrines oxytrope has the most potential to occur near the proposed mine area. The kobuk locoweed has potential to occur along proposed corridors, primarily near rivers between the mine area and coast, and perhaps on coastal sand dunes. None of the species of concern have been located to date by field searches conducted from 1981 to 1983 by Dames & Moore (1983a,b). Thus, it appears unlikely that candidate threatened or endangered, or rare plant species are present in areas proposed for development by the Red Dog Mine project.

Plant collections (Dames & Moore 1983a,b) strongly indicate that the limited distribution of many species desginated as "rare" is in fact due to inaccessibility. For example, the Dames & Moore studies indicated that ranges of Allium schoenoprasum var. sibiricum, Angelica lucida, and Senecio pseudoarnica are apparently more widespread than previously indicated by Hulten (1968). Similarly, Taraxacum phymatocarpum, although rarely collected, is well-represented along the coast, both south and north of Kivalina.

Peregrine Falcons

Although the project area is located within 150 miles of one of the largest concentrations of peregrines in North America, the Colville River drainage (Kessel and Cade 1958, Cade 1960), the southern slopes of the Brooks Range are not noted for high peregrine density. The Noatak drainage to the east supported a few peregrines in the past (Hines 1963, Haugh and Potter 1975). The Cape Thompson region, northwest of the survey area, has historically supported a couple pair of peregrines (Swartz 1966). Located east and northeast of the project area, the Kuparuk and Ipewik River drainages have had peregrines in the past (Hines and Williamson, quoted in White and Boyce 1977). More specific to the project area, both the Kivalina and Wulik Rivers were surveyed by fixed wing aircraft by White and Boyce (1977) but no peregrines were found. According to those investigators, overall habitat along the Kivalina and Wulik Rivers was considered of lesser importance compared to other rivers in the region because of the lack of and quality of cliff structures. Raptor surveys (Douglas and Bente 1980) conducted in 1978 and 1979 by LGL for GCO's proposed mine located proximate to the Cominco Red Dog Mine located no peregrine nests in the study area.

Dames & Moore 1982 field studies of the Wulik and Kivalina River drainages located seven active peregrine eyries in the vicinity of proposed northern and southern transportation corridors for the Red Dog Mine (Dames & Moore 1983a). An additional 11 peregrines were observed away from nests. The sites identified as peregrine nests were not located along the major rivers but were found along the cliffs and bluffs in less obvious areas (i.e., small streams and tributaries) not generally covered during previous peregrine surveys.

Between June 15-23 and on July 31, 1983, followup field studies (Dames & Moore 1983c) were conducted to determine if the peregrine nests located in 1982 were again occupied by the birds and to survey the Singoalik River drainage. A check of each nest site where peregrines were located on the 1982 survey failed to yield a single active peregrine nest. A total of four sites were completely inactive, one site was occupied by rough-legged hawks (Buteo lagopus), and three of the cliffs were occupied by gray-phase gyrfalcons (Falco rusticolus). No active raptor nests were located along the remainder of the Singoalik River drainage.

Peregrines present in the project area would be most vulnerable to human disturbance during nesting. Possible effects could be loss of birds and reduced reproductive success. The current alignments of transportation corridors proposed for the project are located greater than 2 miles from any peregrine nest located during Dames & Moore's 1982 studies. If a 2-mile buffer around these sites or any others located prior to construction is honored, essentially no impact should occur to peregrines nesting in the area. Any migrating peregrines would avoid areas where potentially disturbing activity occurs.

In addition to providing a 2-mile buffer around the nests, steps would be taken to avoid disturbance to peregrines from aircraft and helicopters. Operators would be provided maps and be required to travel corridors and at altitudes which would avoid disturbing known peregrine falcon nests.

There would be no significant impact on prey species. Shorebirds and waterfowl generally comprise a major portion of the peregrine's diet. However, the location of project components avoids the major shorebird and waterfowl nesting and staging areas (see Figure IV-3, page IV-13, of the DEIS). Upland habitat losses along the preferred road corridor would be locally insignificant in view of the abundance of this type of habitat in the project area. Thus any upland species which may comprise a portion of the peregrine's prey base would not be significantly affected. However, peregrine feeding activity may be modified due to construction of the road. No herbicides or pesticides are proposed to be used. Potential disturbance of peregrine nests due to increased access to the area should not be a problem since the access road would not be available for general public use.

Conclusions

No candidate threatened or endangered plant species have been located at the mine site, along proposed transportation corridors, or at proposed port sites. Ranges of "rare" species are apparently more widespread than previously indicated.

If 2-mile buffer zones around peregrine nesting sites are honored and aircraft avoid known nesting sites, minimal or no impact to this species should occur as a result of the Red Dog project.

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Marine Mammals

Based on comments received from the National Marine Fisheries Service, bowhead and gray whales are endangered species present in the study area. The bowhead whales (*Balaena mysticetus*) and the gray whale (*Eschrichtius robustus*) are listed as endangered under the Endangered Species Act of 1973 as amended. Both species migrate into or through the Chukchi Sea near the study area.

Bowhead Whales

The most recent estimate of the number of bowhead whales in waters adjacent to Alaska is 3,857 individuals. The western Arctic population winters in the western and central Bering Sea (Braham et al., 1980). The northward migration is collated with the timing of ice breakup usually beginning in early April. As they move through the Chukchi Sea, the bowhead whales follow ice leads occurring seaward of the landfast ice. These leads usually bring them across outer Kotzebue Sound in a northeasterly direction to the vicinity of Cape Thompson. Some whales move through a persistent polynya that forms between Kivalina and Point Hope (Braham et al., 1980). Most of these animals then move from the Chukchi Sea into the Beaufort Sea and on the summering areas near Banks Island in Arctic Canada. After summering in Canadian waters, the fall migration takes the bowhead whales past Point Barrow and on westward toward Hereld and Wrangell Islands and on to the western portion of the Chukchi Sea (Braham and Krogman, 1977; and Cowles, 1981).

Dames & Moore (1983) conducted field surveys to locate all marine mammals in the project area. No bowhead whales were observed during their traditional migration period in late April and early May. However, a cow and calf were observed on June 25, 1982, a few hundred yards offshore of Kivalina Village heading north. During subsequent flights both north and south of Kivalina helicopter pilots reported seeing large black whales approximately 6 times during the following week. The whales were swimming north generally within one mile of the shore. Groups size ranged from four to six. The last sighting occurred around July 1, 1982.

Gray Whales

The National Marine Fisheries Service assumes that essentially the entire population of California Gray Whales, estimated at 15,000 to 17,000 individuals, migrates north from their wintering grounds and into the Bering Sea in April and May. By June many move through the Bering Strait and enter the Chukchi Sea. During the summer, most of the population concentrates in shallow waters around St. Lawrence Island and northward to the Chukchi Sea where the gray whale distribution coincides with high densities of the benthic gammarid amphipods, on which they forage. Between July and September, low numbers of gray whales regularly move as far east as Point Barrow (Marguette and Braham, 1982). A smaller number of gray whales may occassionally move as far east as the northwest territories in Canada (Maher, 1960; Johnson et al., 1980; and Rugh and Fraker, 1981).

During Dames & Moore's marine mammal surveys, gray whales were sighted on three different occasions between July and August 1982. The first observation occurred on July 18, when a lone animal was observed feeding off Kavorak Lagoon in very shallow water. The second sighting was on July 22, 1982, when another gray whale was seen off Imikruk Lagoon as it passed under the boat of the diving crew in very shallow water. The last observation occurred on August 2, 1982, during an annual bird survey when a lone animal was seen swimming southward off Ipiavik Lagoon. The latter animal appeared to have a very noticeable lateral curvature of the lower spine just above the tail. This feature could possibly help to identify this individual in other parts of its range.

Conclusions

Bowhead whales in the project area would be most vulnerable to human disturbance during the migration period. Based on potential impacts identified during research in other parts of Alaska, possible effects would include disturbance from boats or low-flying aircraft. However, the disturbance of these animals during spring migration is tied to open-leads in the ice pack and little disturbance would be anticipated from shoreside activities related to the mineral concentrate storage and transfer facilities because the area of landfast ice is usually 1 mile or more in width.

Vessel traffic for movement of concentrate away from Alaska or supplies or materials to Alaska would occur after the ice has gone, which usually occurs around July 1st. As a result, the bowhead migration would pass through the Kivalina area before the annual shipping season begins, resulting in no disturbance to migrating bowhead whales.

Gray whales within the project area would be most vulnerable to human disturbance during the summer shipping period since they migrate and feed in very shallow nearshore waters in July and August. However, gray whales are uncommon in the Kivalina area and marine mammal specialist John Burns (Alaska Department of Fish & Game) said that he anticipates essentially no impact from gray whales encountering causeway/dock structures approximately 400 feet or less in length. However, vessel traffic during lightering operations between the dock structure and an offshore island system may have to be interrupted for short periods if gray whales should begin feeding within the port area. It is assumed that any migrating whales would avoid the areas where potentially disturbing activity was occurring.

In order to avoid any potential for harassment of endangered whales in the project area, the following guidelines would be adhered to:

> (1)(a) Vessels and aircraft would avoid concentrations of groups of whales. Operators would, at all times, conduct their activities at a maximum distance from such concentrations of whales. Under no circumstances, other than an emergency, would aircraft be operated at an altitude lower than 1,000 feet when within 500 lateral yards of groups of whales. Helicopters would not hover or circle above such areas or within 500 lateral yards of such areas.

(b) When weather conditions do not allow a 1,000 foot flying altitude, such as during severe storms or when cloud cover is low, aircraft would be operated below the 1,000 foot altitude stipulated above. However, when aircraft are operated at altitudes below 1,000 feet because of weather conditions, the operator would avoid known whale concentration areas and would take precautions to avoid flying directly over or within 500 yards of groups of whales.

(2) When a vessel is operated near a concentration of whales the operator would take every precaution to avoid harassment of these animals. Vessels would reduce speed when within 300 yards of whales and those vessels capable of steering around such groups would do so. Vessels would not be operated in such a way as to separate members of a group of whales from other members of the group.

(3) Vessel operators would avoid multiple changes in direction and speed when within 300 yards of whales. In addition, operators would check the waters immediately adjacent to a vessel to ensure that no whales would be injured when the vessel's propellers [or screws] are engaged.

(4) Small boats would not be operated at such a speed as to make collisions with whales likely. When weather conditions require, such as when visibility drops, vessels would adjust speed accordingly to avoid the likelihood of injury to whales.

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
1011 E. TUDOR RD.
ANCHORAGE, ALASKA 99503
(907) 276-3800

IN REPLY REFER TO:

SE

15 AUG 1983

William M. Riley, EIS Project Officer
U. S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Riley:

This responds to your July 19, 1983 request for a list of threatened or endangered species in the vicinity of the Red Dog Mine project. As described in your request, the project includes a triangular area bounded by Cape Thompson on the northwest, the Red Dog deposit on the northeast (T.31N, R.18W), Cape Krusenstern to the south and the Chukchi Sea to the southwest.

Based on the best information currently available to us, the Arctic Peregrine Falcon (Falco peregrinus tundrius) is the only listed endangered species present in the project area. The endangered Eskimo curlew (Numenius borealis) may have historically nested in this region. Now nearly extinct, the Eskimo curlew has not been recorded in Alaska since the late 1880's and need not be considered further in this consultation. Additionally, the Service maintains a list of rare Alaska plants which are considered candidates for possible future listing as threatened or endangered. Although none of the plants are known to occur in the project area, the January 1983 Baseline Study prepared by Dames and Moore, points out that no vegetation studies have been conducted in the transportation corridors. If candidate threatened or endangered plants are found within the project area, they and their habitats should be considered in the environmental planning process.

As previously stated in our March 7, 1983 correspondence, Section 7(c) of the Endangered Species Act of 1973, as amended, requires Federal agencies to prepare a biological assessment when threatened or endangered species have been identified in the vicinity of a proposed construction project that is a major Federal action significantly affecting the quality of the human environment. Since the Baseline Study (pages 5-71, 72) acknowledges that a small but significant number of endangered Peregrine Falcons occur in the vicinity of the transportation corridor, a biological assessment for the Red Dog project is required. The assessment should be completed in conjunction with the National Environmental Policy Act process and can be a section within the environmental impact statement that closely examines the potential effects of all three components of the action on the peregrine. In general, a biological assessment should include the following:

a. An onsite inspection of the area affected by the proposed project.

b. Interviews with recognized experts on the species at issue.

c. A literature review to determine the species distribution, habitat needs, and other biological requirements.

d. An analysis of possible impacts to the species, including cumulative effects.

e. An analysis of measures to minimize impacts.

Biological assessments may be prepared by a designated non-Federal entity. If, as a result of the assessment, it is concluded that the proposed activity may affect the Peregrine Falcon, then a request for formal consultation should be submitted with a copy of the assessment to the Regional Office of the Fish and Wildlife Service.

We appreciate your concern for endangered wildlife. Questions or requests for further assistance can be directed to our Endangered Species Division (907) 786-3435.

Sincerely,

Acting Regional Director

cc: NAES
LWRDP

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 1668
Juneau, Alaska 99802

September 28, 1983

RECEIVED
OCT 5 1983
ENVIRONMENTAL EVALUATION
BRANCH

Mr. William M. Riley
Environmental Evaluation Branch (M/S 443)
Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Riley:

This letter is in response to your September 2, 1983, request for information concerning rare, threatened, or endangered species under the jurisdiction of the National Marine Fisheries Service (NMFS) which occur in the Chukchi Sea between Cape Thompson and Cape Krusenstern. NMFS bears responsibility for two species of endangered whales which frequent the Chukchi Sea in the area under consideration by the Red Dog Mining project Environmental Impact Statement (EIS): the bowhead whale (Balaena mysticetus) and the gray whale (Eschrichtius robustus).

General description of endangered whales occurrence in the Chukchi Sea:

Bowhead whale: The most recent estimate of the number of bowhead whales in waters adjacent to Alaska is 3857 individuals. The western Arctic population of bowhead whales winters in the western and central Bering Sea (Braham et al., 1980). The northward (spring) migration is correlated with the timing of ice breakup, usually beginning in early April. Most of the whales move through the Straif Anadyr, passing west of St. Lawrence Island, when they leave the Bering Sea. From there, they generally pass through the Bering Strait west of Big Diomede Island. However, the availability of open water determines the bowhead's migratory path and the whales could possibly use the east side of the Strait in some years (Braham et al.,1980; Cowles, 1981). Once in the Chukchi Sea, the bowhead whales follow ice-leads occurring seaward of the landfast ice. These leads usually bring them across outer Kotzebue Sound in a north-easterly direction to the vicinity of Cape Thompson. Some whales move through a persistent polynya that forms between Kivalina and Point Hope (Braham et al., 1980). Open leads are again followed past Cape Thompson and Point Hope to Cape Lisburne. In the vicinity of Cape Lisburne, the population begins to follow the leads adjacent to the landfast ice on its way to Point Barrow (Braham et al., 1980; Rugh and Cubbage, 1980).

From Point Barrow, the bowheads travel north-east toward Banks Island in Canada. The majority of the whales enter the Canadian Beaufort Sea by mid-June, where they spend the summer. The fall migration, after passing Point Barrow, travels west toward Herald and Wrangell Islands prior to heading south. The migration toward the Bering Strait is believed to occur in the western Chukchi Sea (Braham and Krogman, 1977; Cowles, 1981).

Gray Whale: Virtually the entire stock of California gray whales, estimated at 15,000 to 17,000 individuals, migrates north from their wintering grounds and enter the Bering Sea in April or May. By June, many move through the Bering Strait and enter the Chukchi Sea. During the summer, most of the population concentrates in shallow waters around St. Lawrence Island north to the Chukchi Sea where the grey whale distribution coincides with high densities of the benthic gammarid amphipods, on which they forage. Between July and September, low numbers of gray whales regularly move as far east as Point Barrow (Marquette and Braham, 1982). A smaller number of gray whales may occasionally move as far east as the Northwest Territories in Canada (Maher, 1960; Johnson et al., 1980; Rugh and Fraker, 1981).

If we can be of further assistance, or if additional details on these endangered whales are needed, please do not hesitate to consult further with us.

Sincerely,

John O. [illegible]

for: Robert W. McVey
Director, Alaska Region

Literature Cited

Braham, H.W., Fraker, M.A., and Krogman, B.D., 1980. Spring migration of the western Arctic population of bowhead whales., Mar. Fish. Rev. 42(9-10):36-46.

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Cowles, C.J., 1981. Biological Assessment for Endangered Whales of the Arctic Region with Respect to Proposed Offshore Oil and Gas Exploration. Bureau of Land Management, Alaska OCS Office. 42 pp.

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Rugh, D.J. and Fraker, M.A., 1981. ay whale (*Eschrichtius robustus*) sightings in eastern Beaufort Sea. Arctic 34(2):186-187.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
1011 E. TUDOR RD.
ANCHORAGE, ALASKA 99503
(907) 276-3800

IN REPLY REFER TO:

SE

30 JAN 1984

William M. Riley, EIS Project Officer
U. S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Riley:

This responds to your request for comments on EPA's Biological Assessment (BA) for the Red Dog Mine Project. The BA was initiated as a result of our August 15, 1983, letter to you indicating the occurrence of the endangered Arctic peregrine falcon within the proposed project area.

Section 7(c) of the Endangered Species Act of 1973, as amended, requires Federal agencies to prepare a BA when threatened or endangered species occur in the vicinity of a proposed construction project that is a major Federal action significantly affecting the quality of the human environment. The August 15 letter further identified what a BA should entail. Specifically:

a. An onsite inspection of the area affected by the proposed project.

b. Interviews with recognized experts on the species at issue.

c. A literature review to determine the species distribution, habitat needs, and other biological requirements.

d. An analysis of possible impacts to the species, including cumulative effects.

e. An analysis of measures to minimize impacts.

The BA, as written, satisfies items a, b, and c above. It is deficient, however, relative to d and e.

Prerequisite to an analysis of possible impacts (d) is a project description. This could be accomplished by including a description of the various components of the project in the BA or by referring to the appropriate sections of the Environmental Impact Statement (EIS). A map of the project area would also be useful. Perhaps this too could be accomplished by reference to the EIS.

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Each project component which may directly or indirectly affect the Arctic peregrine on either a short or long-term basis should be addressed and the specific area of conflict identified. Examples of potential impacts include: greater frequency of low-flying aircraft, increased recreational use of the area as a result of improved access, changes in the prey base brought on by alteration of vegetation, and use of chemical insecticides.

Once potential conflicts have been identified, means of avoiding or minimizing the impacts (e) should be discussed. At this point in time, we do not believe your analysis is thorough enough to support your conclusion that the Red Dog Mine project, with its associated transportation corridors and other developments, will not affect the endangered Arctic peregrine falcon.

If measures are taken to avoid all conflicts, the project will obviously have no effect on endangered species and formal consultation will not be required. If conflicts remain, however, endangered species may be affected and formal consultation will be necessary.

Questions regarding these comments may be directed to our Endangered Species Division at (907) 786-3435. Thank you for the opportunity to review the BA and for your cooperation in protecting endangered wildlife.

Sincerely,

Deputy Regional Director

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION X
1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101

REPLY TO
ATTN OF: M/S 443

FEB 14 1984

Robert E. Putz
Director, Alaska Region
U.S. Fish and Wildlife Service
1011 E. Tudor Road
Anchorage, Alaska 99503

Dear Mr. Putz:

Thank you for your January 30, 1984, comments on the Biological Assessment prepared for the Red Dog Mine Project. The Assessment has been modified to reflect your concerns related principally to potential indirect project impacts on the peregrine falcon.

As the Biological Assessment now references appropriate sections of the project EIS, I trust that having the Draft EIS in hand will help clarify the small potential for disturbance to peregrine falcons. The Draft EIS will be distributed in early March 1984. We will be happy to work with you to provide any additional information you feel should be included in the Biological Assessment.

Sincerely,

William M. Riley
William M. Riley
EIS Project Officer

cc: Dennis Money, USFWS w/attachment
Robin West, USFWS w/attachment
Harry Noah, Cominco w/attachment

PROPOSED FINAL
NPDES PERMIT FOR
DISCHARGES FROM THE TAILINGS
IMPOUNDMENT WASTEWATER
TREATMENT FACILITY

Permit No.: AK-003865-2
Application No.: AK-003865-2

AUTHORIZATION TO DISCHARGE UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Water Pollution Control Act, as amended, (33 U.S.C. Section 1251 et seq; the "Act"),

COMINCO ALASKA INCORPORATED

is authorized to discharge from a facility located 82 miles north of Kotzebue, Alaska to receiving waters named Red Dog Creek in accordance with the discharge point, effluent limitations, monitoring requirements and other conditions set forth herein.

This permit shall become effective

This permit and the authorization to discharge shall expire at midnight, (five years from the effective date).

Signed this day of

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Director, Water Division, Region 10
U.S. Environmental Protection Agency

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I. Effluent Limitations and Monitoring Requirements

A. Specific Limitations and Monitoring Requirements

1. The following effluent limitations and monitoring requirements shall apply to all discharges from the tailings impoundment wastewater treatment facility (outfall 001):

Effluent Characteristics	Effluent Limitations		Monitoring Requirements	
	Daily Maximum	30 Day Average	Frequency	Sample Type
			(During Discharge)	
Flow (mgd)	7.1	5.4	Continuous	Recorded
Copper (mg/l)	0.3	0.15	Weekly	Grab
Zinc (mg/l)	1.5	0.75	Weekly	Grab
Lead (mg/l)	0.6	0.3	Weekly	Grab
Cadmium (mg/l)	0.10	0.05	Weekly	Grab
Mercury (mg/l)	0.002	0.001	Weekly	Grab
Total Suspended Solids (mg/l)	30.0	20.0	Weekly	24 hr. Composite
pH	(see paragraph 4. below)		Daily	Grab
Temperature	N/A	N/A	Daily	Grab

2. Discharges are only permitted during the months of May through October.

3. There shall be no discharge of floating solids or oily wastes which produce a sheen on the surface of the receiving water.

4. The pH shall not be less than 6.0 standard units nor greater than 10.5 standard units.

5. All discharges shall comply with Alaska Water Quality Standards (18 AAC10).

B. Receiving Water Monitoring Program

1. Ambient water quality monitoring shall be performed at two (2) stations on Ikalukrok Creek. Data collection shall occur seasonally from break-up (mid May) to freeze up (mid October). The initial three years of monitoring prior to discharge beginning the effective date of this permit will be used to expand the existing baseline data. Subsequent monitoring following the initiation of discharge from the tailings impoundment wastewater treatment facility will be used to characterize impacts of the operation on the Wulik River drainage.

Station identification codes correspond to those identified in the Dames and Moore "Environmental Baseline Studies - Red Dog Project" as follows:

Site 9: Ikalukrok Creek above confluence with Red Dog Creek
Site 73: Ikalukrok Creek downstream of confluence with Red Dog Creek

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The following table identifies parameters and frequency of collection for both receiving water and biomonitoring programs:

	Site 73	Site 9	Flow-thru Biomonitoring Facility
Flow	b	a	a
Conductivity	b	b	a
Suspended Solids	b	b	c
Turbidity	b	b	c
Cadmium (total)	b	b	a
Iron	b	b	a
Lead	b	b	a
Zinc	b	b	a
Aluminum	b	b	a
Hardness	b	b	a
Temperature	b	b	a
Dissolved Oxygen	b	b	c
pH	b	b	c

Frequency Codes:
a) continuous
b) weekly (grab)
c) daily (grab)

2. A quality assurance plan shall be developed, the primary purpose of which shall be to assist in explaining data anomalies, if and when they occur. The quality assurance plan shall also provide information on sampling and laboratory analytical techniques. The plan shall include activities such as replicates on ten percent of samples, analyses of sample blanks to identify contaminated sampling equipment and spiked samples for metals analysis.

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C. Biomonitoring Program

To provide an early warning system as a part of the water treatment plant process control, the permittee will be required to develop, subject to State approval, a continuous flow-thru biomonitoring facility which meets the following criteria:

1. The biomonitoring facility shall provide for the maintenance of cold-water fish specie(s). Control and test organisms shall be continuously subjected to water which is a dilution of the effluent with local surface waters. Effluent to surface water dilution ratios shall produce a surrogate of the effluent's ultimate dilution in the Ikalukrok, except that the dilution shall be 10% more concentrated than would be expected as a safety margin. This will be accomplished using realtime flow data from the Ikalukrok above the confluence of Red Dog Creek and realtime flow data from the plant effluent. The surrogate solution shall be monitored for pH, conductivity, temperature and divalent cations.

2. The test organisms shall be continuously or frequently observed for symptoms of distress and mortality. TYPE I and TYPE II warning levels are recommended. The TYPE I warning level is defined as symptoms of distress related to engineering failure of the biomonitoring facility. A TYPE II warning level is defined as an effluent caused distress incident. Observations of distress (either TYPE I or TYPE II) will result in necessary actions being taken by personnel to prevent distress in the monitored organisms.

3. Notification of ADEC within 24 hours from the time of occurrence of a TYPE II warning level will be required, including information on pH, conductivity, temperature and divalent cations at the time of the incident. Any remedial actions taken to mitigate the TYPE II incident will also be communicated.

4. Fish which have exhibited symptoms of distress, whether TYPE I or TYPE II, shall be replaced with fresh equivalent stock, maintained for that purpose.

5. This biomonitoring facility shall be tested, verified and operational when discharge commences from the tailings impoundment water treatment facility.

D. Precipitation and Evaporation Monitoring Program

1. The permittee shall establish monitoring stations at the mine site for determining the annual precipitation and annual evaporation rates. This monitoring program shall begin on the effective date of this permit and end on the expiration date.

2. The permittee shall submit to EPA the monitoring results annually. The first report is due one year from the effective date of this permit.

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E. Best Management Practices

1. The permittee shall develop a Best Management Practices (BMP) program in accordance with good engineering practices and the following conditions:

   a. The BMP program shall:

      (1) Be documented in narrative form, and shall include any necessary plot plans, drawings or maps;

      (2) Establish specific objectives for the control of toxic and hazardous pollutants.

         (i) Each facility component or system shall be examined for its potential for causing a release of toxic or hazardous pollutants to waters of the United States due to equipment failure, improper operation, natural phenomena such as rain or snowfall, etc.

         (ii) Where experience indicates a reasonable potential for equipment failure (e.g. a tank overflow or leakage), natural condition (e.g. precipitation), or other circumstances to result in significant amounts of toxic or hazardous pollutants reaching surface waters, the program should include a prediction of the direction, rate of flow and total quantity of toxic or hazardous pollutants which could be discharged from the facility as a result of each condition or circumstance;

      (3) Establish specific best management practices to meet the objectives identified under paragraph a.(2) of this section, addressing each component or system capable of causing a release of toxic or hazardous pollutants to the waters of the United States.

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(4) The BMP program:

(i) May reflect requirements for Spill Prevention Control and Countermeasure (SPCC Plan) under Section 311 of the Act and 40 CFR Part 112, and may incorporate any part of such plans into the BMP program by reference;

(ii) Shall assure the proper management of solid and hazardous waste in accordance with regulations promulgated under the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976 (RCRA)(40 U.S.C. 6901 et seq). Management practices required under RCRA regulations shall be expressly incorporated into the BMP program; and

(iii) Shall address the following points for the ancillary activities:

(A) Statement of Policy;
(B) Spill Control Committee;
(C) Material Inventory;
(D) Material Compatibility;
(E) Employee Training;
(F) Reporting and Notification Procedures;
(G) Visual Inspections;
(H) Preventive Maintenance;
(I) Housekeeping; and
(J) Security.

[Ancillary activities include but are not limited to: Materials storage areas; in-plant transfer, process and material handling areas; loading and unloading operations; plant site runoff; and sludge and waste disposal areas.]

2. The permittee shall submit this BMP program to both EPA and ADEC for approval within eight months of the effective date of this permit.

3. The BMP program shall be fully implemented as soon as possible but no later than one year after the effective date of this permit or upon commencement of facility construction activities, whichever occurs first.

4. The permittee shall amend the BMP program whenever there is a change in the facility design, construction, operations, or maintenance which materially affects the facility's potential for discharge of significant amounts of hazardous or toxic pollutants into the waters of the United States.

5. If the BMP program proves to be ineffective in achieving the general objective of preventing the release of significant amounts of toxic or hazardous pollutants to those waters and the specific objectives and requirements under paragraph 1.a. of this section, the permit and/or the BMP program shall be subjected to modification to incorporate the revised BMP requirements.

6. Upon approval, the terms and conditions of the BMP program shall become part of this permit.

7. The permittee shall maintain a description of the BMP program at the facility and shall make the description available to the Director upon request.

F. Definitions

1. "30 Day Average" shall mean the total units discharged during a monitoring month divided by the number of days in that period that the production or commercial facility was operating. Where less than daily sampling is required by this permit, this average shall be determined by the summation of the measured daily discharges divided by the number of days during the monitoring month when the measurements were made.

2. "Daily Maximum" shall mean the maximum value attained on any day in a given monitoring month.

3. "Monitoring Month" shall mean the period consisting of the calendar weeks which end in a given calendar month.

4. A "24 hour composite" ("24 hr. Comp.") sample shall mean a flow-proportioned mixture of not less than 4 discrete aliquots. Each aliquot shall be a grab sample of not less than 100 ml and shall be collected and stored in accordance with procedures prescribed in the most recent edition of Standard Methods for the Examination of Water and Wastewater.

5. A "Grab" sample is a single sample or measurement taken at a specific time or over as short a period of time as is feasible.

6. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

7. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.

8. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

II. Monitoring, Recording and Reporting Requirements

A. Representative Sampling

Samples taken in compliance with the monitoring requirements established under Part I. A. shall be collected from the effluent stream prior to discharge into the receiving waters. Samples and measurements shall be representative of the volume and nature of the monitored discharge.

B. Monitoring Procedures

Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit.

C. Penalties for Tampering

The Clean Water Act provides that any person who falsifies, tampers with or knowingly renders inaccurate, any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

D. Reporting of Monitoring Results

Monitoring results shall be summarized each month on Discharge Monitoring Report (DMR) form (EPA No. 3320-1). The reports shall be submitted monthly and are to be postmarked by the 10th day of the following month. Legible copies of these, and all other reports, shall be signed and certified in accordance with the requirements of Part IV. G. Signatory Requirements, and submitted to the Director, Water Division and the State agency at the following addresses:

original to:
United States Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

Attn: Water Compliance Section, Mail Stop 513

copy to: Alaska Department of Environmental Conservation
Northern Regional Office
675 7th Avenue
P.O. Box 1601
Fairbanks, Alaska 99707

E. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on interim and final requirements contained in any Compliance Schedule of this permit (Part I. A.) shall be submitted no later than 10 days following each schedule date.

F. Additional Monitoring by the Permittee

If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR 136 or as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR. Such increased frequency shall also be indicated.

G. Records Contents

Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements;
2. The individual(s) who performed the sampling or measurements;
3. The date(s) analyses were performed;
4. The individual(s) who performed the analyses;
5. The analytical techniques or methods used; and
6. The results of such analyses.

H. Retention of Records

The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application. This period may be extended by request of the Director at any time.

I. Twenty-four Hour Notice of Noncompliance Reporting

1. The following occurrences of noncompliance shall be reported by telephone within 24 hours from the time the permittee becomes aware of the circumstances:

   a. Any noncompliance which may endanger health or the environment.

   b. Any unanticipated bypass which exceeds any effluent limitations in the permit. (See Part III. G. Bypass of Treatment Facilities.)

   c. Any upset which exceeds any effluent limitation in the permit. (See Part III. H. Upset Conditions.)

   d. Violation of a maximum daily discharge limitation for any of the pollutants listed in the permit to be reported within 24 hours.

2. A written submission shall also be provided within 5 days of the time that the permittee becomes aware of the circumstances. The written description shall contain:

   a. A description of the noncompliance and its cause;

   b. The period of noncompliance, including exact dates and times;

   c. The estimated time noncompliance is expected to continue if it has not been corrected; and

   d. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

3. The Director may waive the written report on a case-by-case basis if the oral report has been received within 24 hours by the Water Compliance Section in Seattle, Washington by phone, (206) 442-1213.

4. Reports shall be submitted to the addresses in Part II. D. Reporting of Monitoring Results.

J. Other Noncompliance Reporting

Instances of noncompliance not required to be reported within 24 hours shall be reported at the time that monitoring reports for Part II. D. are submitted. The reports shall contain the information listed in Part II. I. 2.

K. Inspection and Entry

The permittee shall allow the Director, or an authorized representative, upon presentation of credentials and other documents as may be required by law, to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit.

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

3. Inspect at reasonable times any facilities; equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit, and

4. Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by the Clean Water Act, any substances or parameters at any location.

III. Compliance Responsibilities

A. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application. The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

B. Penalties for Violations of Permit Conditions

The Clean Water Act provides that any person who violates a permit condition implementing sections 301, 302, 306, 307, 308, 318, or 405 of the Clean Water Act is subject to a civil penalty not to exceed $10,000 per day of such violation. Any person who willfully or negligently violates permit conditions implementing sections 301, 302, 306, 307, or 308 of the Clean Water Act is subject to a fine of not less than $2,500, nor more than $25,000 per day of violation, or by imprisonment for not more than 1-year, or both. Except as provided in permit conditions on Part III. G. Bypass of Treatment Facilities and Part III. H. Upset Conditions, nothing in this permit shall be construed to relieve the permittee of the civil or criminal penalties for noncompliance.

C. Need to Halt or Reduce not a Defense

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

D. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a likelihood of adversely affecting human health or the environment.

E. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

F. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such material from entering navigable waters.

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G. Bypass of Treatment Facilities:

1. Bypass not exceeding limitations; the permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs 2. and 3. of this section.

2. Notice:

a. Anticipated bypass; if the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least 10 days before the date of the bypass.

b. Unanticipated bypass; the permittee shall submit notice of an unanticipated bypass as required under Part II. I. Twenty-Four Hour Reporting.

3. Prohibition of bypass:

a. Bypass is prohibited and the Director may take enforcement action against a permittee for a bypass, unless:

(1) The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(2) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if the permittee could have installed adequate backup equipment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

(3) The permittee submitted notices as required under paragraph 2. of this section.

b. The Director may approve an anticipated bypass, after considering its adverse effects, if the Director determines that it will meet the three conditions listed above in paragraph 3.a. of this section.

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H. Upset Conditions:

1. Effect of an upset; an upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of paragraph 2. of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

2. Conditions necessary for a demonstration of upset; a permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

a. An upset occurred and that the permittee can identify the specific cause(s) of the upset;

b. The permitted facility was at the time being properly operated; and

c. The permittee submitted notice of the upset as required under Part II. I. Twenty-Four Hour Notice of Noncompliance Reporting.

d. The permittee complied with any remedial measures required under Part III. D. Duty to Mitigate.

3. Burden of proof; in any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

I. Toxic Pollutants

The permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

IV. GENERAL REQUIREMENTS

A. Changes in Discharge of Toxic Substances

Notification shall be provided to the Director as soon as the permittee knows of, or has reason to believe:

1. That any activity has occurred or will occur which would result in the discharge of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

a. One hundred micrograms per liter (100 ug/l);

b. Two hundred micrograms per liter (200 ug/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 ug/l) for 2, 4-dinitrophenol and for 2-methyl-4, 6-dinitrophenol; and one milligram per liter (1 mg/l) for antimony;

c. Five (5) times the maximum concentration value reported for that pollutant in the permit application;

2. That the permittee has begun or expects to begin to use or manufacture as an intermediate or final product or byproduct any toxic pollutant which was not reported in the permit application.

B. Planned Changes

The permittee shall give notice to the Director, as soon as possible, of any planned physical alterations or additions to the permitted facility. The permittee shall also give advance notice of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

C. Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

D. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. The application should be submitted at least 180 days before the expiration date of this permit.

E. Duty to Provide Information

The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit.

F. Other Information

When the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or any report to the Director, it shall promptly submit such facts or information.

G. Signatory Requirements

All applications, reports or information submitted to the Director shall be signed and certified.

1. All permit applications shall be signed as follows:

   a. For a corporation: by a responsible corporate officer;

   b. For a partnership or sole proprietorship: by a general partner or the proprietor, respectively.

   c. For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official.

2. All reports required by the permit and other information requested by the Director shall be signed by a person described above or by a duly authorized representative only if:

   a. The authorization is made in writing by a person described above and submitted to the Director.

   b. The authorization specified either an individual or a position having responsibility for the overall operation of the regulated facility or activity , such as the position of plant manager, operator of a well or a well field, superintendent, or position of equivalent responsibility. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.)

3. Changes to authorization. If an authorization under paragraph IV. G. 2. is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph IV. G. 2. must be submitted to the Director prior to or together with any reports, information, or applications to be signed by an authorized representative.

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4. Certification. Any person signing a document under this section shall make the following certification:

> "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

H. Penalties for Falsification of Reports

The Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports of compliance or noncompliance shall, upon conviction be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

I. Availability of Reports

Except for data determined to be confidential under 40 CFR Part 2, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the State water pollution control agency and the Director. As required by the Act, permit applications, permits and effluent data shall not be considered confidential.

J. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Act.

K. Property Rights

The issuance of this permit does not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

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L. Severability

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

M. Transfers

This permit may be automatically transferred to a new permittee if:

1. The current permittee notifies the Director at least 30 days in advance of the proposed transfer date;

2. The notice includes a written agreement between the existing and new permittees containing a specific date for transfer of permit responsibility, coverage, and liability between them; and

3. The Director does not notify the existing permittee and the proposed new permittee of his or her intent to modify, or revoke and reissue the permit. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in paragraph 2. above.

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PROPOSED DRAFT
NPDES PERMIT FOR
DISCHARGES FROM THE
PORT FACILITY

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION X
1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101

REPLY TO ATTN OF: Mail Stop 521

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

AUG 24 1984

Doug Lowery, Regional Supervisor
Northern Regional Office
Alaska Department of Environmental Conservation
P. O. Box 1601
Fairbanks, Alaska 99707

Re: NPDES Permit No.: AK-004064-9
Cominco Alaska (Port Facility)

Dear Mr. Lowery:

Enclosed for your use in completing a certification action is a copy of the National Pollutant Discharge Elimination System (NPDES) permit which EPA proposes to issue.

Comments that were received on the draft permit have been addressed and incorporated into the enclosed permit. Issuance of the final permit will be contingent on the completion of the statutory requirements of Title XI of the Alaska Lands Conservation Act. It is expected that the Final Environmental Impact Statement will be released for public review in September.

Sincerely,

Harold Geren

Harold E. Geren, Chief
Water Permits and Compliance Branch

Enclosure

cc: Alaska Department of Environmental Conservation, Juneau
Alaska Operations Office, EPA (Anchorage & Juneau)
Bill Riley, EEB/EPA, M/S 443

United States Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101
(206) 442-1214

NOTICE OF PROPOSED ISSUANCE OF A NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO DISCHARGE TO WATERS OF THE UNITED STATES,

NOTICE OF STATE CERTIFICATION

and

NOTICE OF STATE DETERMINATION OF CONSISTENCY WITH THE ALASKA COASTAL ZONE MANAGEMENT PROGRAM

Public Notice No.: AK-004064-9

Public Notice Issuance Date: June 25, 1984
Public Notice Expiration Date: July 25, 1984

1. Applicant

Cominco Alaska
5660 B. Street
Anchorage, Alaska 99502

Cominco proposes to operate a port facility for shipping lead and zinc concentrates from their Red Dog Mine. The port facility is located 17 miles southeast of Kivalina. This facility is a new discharger.

Discharges from the port site will be to the Chukchi Sea. Chukchi Sea is classified by the Alaska Water Quality Standards as classes II A(i)(ii)(iii), B(i)(ii), C and D for use in agriculture, seafood processing and industrial water supply, water contact and secondary recreation, growth and propagation of fish, shellfish aquatic life and wild life, and harvesting for consumption of raw mollusks or other raw aquatic life.

2. Tentative Determination

The Region 10 Office of the Environmental Protection Agency (EPA) has tentatively determined to issue a discharge permit to the above listed applicant. However, issuance of the final permit by EPA will be contingent upon completion of the statutory requirements of Title XI of the Alaska National Interest Lands Conservation Act. Accordingly, this permit cannot be issued unless Cominco is authorized by the Department of the Interior, the President and Congress to construct a mining road through Cape Krusenstern National Monument to the port site.

3. State Certification

This Notice will also serve as Public Notice of the intent of the State of Alaska, Department of Environmental Conservation to consider certifying that the subject discharge will comply with the applicable provisions of Sections 208(e), 301, 302, 303, 306 and 307 of the Clean Water Act. The NPDES permit will not be issued until the certification requirements of Section 401 have been met.

4. State Consistency Determination

This Notice will also serve as Public Notice of the intent of the State of Alaska, Office of Management and Budget, Division of Governmental Coordination, to review this action for consistency with the approved Alaska Coastal Zone Management Program.

5. Public Comments

Persons wishing to comment on the tentative determinations contained in the proposed permit or wishing to request that a public hearing be held, may do so in writing, within 30 days of the date of this public notice. A request for a public hearing shall state the nature of the issues to be raised as well as the requester's name, address and telephone number. Comments must be received within this 30 day period to be considered in the formulation of final determinations regarding the application. All comments should include the name, address and telephone number of the commenter and a concise statement of the exact basis of any comment and the relevant facts upon which it is based.

All written comments and requests should be submitted to EPA at the above address to the attention of the Director, Water Division M/S 521.

Persons wishing to comment on State Certification should submit written comments within this 30 day period to the State of Alaska, Northern Regional Office, Alaska Department of Environmental Conservation (ADEC), P. O. Box 1601, Fairbanks, Alaska 99707.

Persons wishing to comment on the State Determination of Consistency with the Alaska Coastal Zone Management Program should submit written comments within this 30 day period, to the State of Alaska, Northern Regional Office, Office of Management and Budget, Division of Governmental Coordination, 675 7th Avenue, Station H, Fairbanks, Alaska 99701. Comments should be addressed to the attention of Alaska Coastal Management Program Consistency Review.

6. Administrative Record

The proposed NPDES permit and other related documents are on file and may be inspected and copies made in Room 11D at the above address any time between 8:30 a.m. and 4:00 p.m., Monday through Friday. Copies and other information may be requested by writing to the EPA at the above address to the attention of the Water Permits Section M/S 521, or by calling (206) 442-1214. This material is also available from the EPA Alaska Operations Office, Room E535, 701 C Street, Anchorage, Alaska 99513 or EPA Alaska Operations Office, 3200 Hospital Drive, Suite 101, Juneau, Alaska 99801. A copying machine is available in the Seattle office for public use at a charge of 20 cents per copy sheet. There is no charge if the total cost is less than 25 dollars.

Fact Sheet

United States Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101
(206) 442-1214

Application No : AK-004064-9 Date: June 25, 1984

PROPOSED ISSUANCE OF A NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO DISCHARGE POLLUTANTS PURSUANT TO THE PROVISIONS OF THE CLEAN WATER ACT

Cominco Alaska
(Port Facilities)

has applied for issuance of a National Pollutant Discharge Elimination System (NPDES) permit to discharge pollutants pursuant to the provisions of the Clean Water Act. This fact sheet includes (a) the tentative determination of the Environmental Protection Agency (EPA) to issue the permit, (b) information on public comment, public hearing and appeal procedures, (c) the description of the proposed discharges, (d) a listing of tentative effluent limitations and other conditions, and (e) a sketch or detailed description of the discharge location. We call your special attention to the technical material presented in the latter part of this document.

Persons wishing to comment on the tentative determinations contained in the proposed permit issuance may do so by the expiration date of the Public Notice. All written comments should be submitted to EPA as described in the Public Comments Section of the attached Public Notice.

After the expiration date of the Public Notice, the Director, Water Division, will make final determinations with respect to the permit issuance. The tentative determinations contained in the draft permit will become final conditions if no substantive comments are received during the Public Notice period. However, issuance of the final permit by EPA will be contingent upon completion of the statutory requirements of Title XI of the Alaska National Interest Lands Conservation Act. Accordingly, this permit cannot be issued unless Cominco is authorized by the Department of the Interior, the President and Congress to construct a mining road through Cape Krusenstern National Monument to the port site.

The permit will become effective 30 days after the final determinations are made, unless a request for an evidentiary hearing is submitted within 30 days after receipt of the final determinations. An evidentiary hearing will be granted only if it meets all the requirements of 40 CFR 124.74.

The proposed NPDES permit and other related documents are on file, may be inspected, and copies made in Room 11D, 1200 Sixth Avenue, Seattle, Washington 98101, at any time between 8:30 a.m. and 4:00 p.m., Monday through Friday. Copies and other information may be requested by writing to EPA at the above address to the attention of the Water Permits Section M/S 521, or by calling (206) 442-1214. This material is also available from the EPA Alaska Operations Office, Room E556, Federal Bldg., 701 C Street, Anchorage, Alaska 99513 or EPA Alaska Operations Office, 3200 Hospital Drive, Suite 101, Juneau, Alaska 99801. A copying machine is available in the Seattle Office for public use at a charge of 20 cents per copy sheet. There is no charge if the total cost is less than 25 dollars.

Technical Information

A. **Applicant:** Cominco Alaska
Mailing Address: 5660 B. Street
Anchorage, Alaska 99502

B. Project Location: West of Mulgrave Hills on the shore of Chukchi Sea
(Approximately 17 miles southeast of Kivalina)
Northwest section of Cape Krusenstern National Monument

C. Background:

Cominco Alaska, Inc. proposes to develop the Red Dog mineral prospect 131 km (82 mi) north of Kotzebue in northwestern Alaska. The proposed mine site is located on Red Dog Creek, just west of Deadlock Mountain in the De Long Mountains of the western Brooks Range. The project would consist of an open pit lead/zinc mine and concentrator located 75 km (47 mi) inland, with interconnecting transportation facilities and shipping facilities located at the coast (See Figure 1.)

EPA and the Department of the Interior (DOI), developed an environmental impact statement (EIS) for the Red Dog Mine project. Figure 1 shows the mine location, the two transportation corridor alternatives (northern and southern), and the port site for each corridor. The preferred corridor is the southern route. Consequently, Cominco has submitted an application for this port site. The subject of this Fact Sheet is the discharges from the preferred port site. The NPDES permit for the mine and mill discharge is being permitted in a separate process and was published in the draft EIS.

D. Project Description:

The port facility will include a deep water dock and a ship loading facility with concentrate receiving, storage and handling facilities; fuel storage and warehouse for supplies necessary for the operation of the mine; and housing for emergency ship loading crews.

The mine and mill operations will operate year-round; however, the port facility will only receive supplies and fuel during the summer sealift, and ship concentrate from late June until early October.

All of the facilities, except the concentrate storage building, are located on the coastline. The storage building is located 2.5 miles east (inland) of the port facilities.

E. Sources of Wastewater

The applicant has applied for the discharge of domestic wastewater, and surface runoff collected from the port area. Domestic wastewater will be treated with a package treatment plant. Discharge will only occur during the shipping season. The estimated discharge is 1500 gallons per day (gpd).

The stormwater runoff at the port facility will be collected and routed to a settling pond for treatment. The estimated average discharge from the pond is 5170 gpd. This is based on a pond sized to contain the runoff from a 10 year-24 hour precipitation event.

F. Receiving Waters

Domestic waste and runoff discharges will be to the Chukchi Sea. Chukchi Sea is classified by the Alaska Water Quality Standards as classes II A(i)(ii)(iii), B(i)(ii), C and D for use in agriculture, seafood processing and industrial water supply, water contact and secondary recreation, growth and propagation of fish, shellfish aquatic life and wild life, and harvesting for consumption of raw mollusks or other raw aquatic life.

G. Basis of Limitations and Monitoring Requirements

EPA has not promulgated national guidelines for storm water runoff from port facilities. Therefore, the permit effluent limits are based on a best professional judgement of applicable technology based limits.

1. Domestic Wastewater

The package treatment plant should provide treatment to achieve secondary treatment standards (40 CFR 133). To ensure that the plant is operating properly, the permittee will be required to sample for BOD and TSS at least once per month during the shipping season (late June until early October).

2. Runoff

The pollutants of concern associated with runoff from the port are solids, and oil and grease. Runoff from the fuel storage area has been limited to an oil and grease limit of 10 mg/l and total suspended solids to 20 mg/l. These limits are based on the use of a settling pond and an oil/water separator. Monitoring for flow and oil and grease will be required weekly.

The fuel storage tanks will contain #1 grade diesel oil. Diesel is considered to be highly toxic to aquatic life. However, leaks from the tanks will not result in a direct discharge to any receiving waters since the tanks will be within a bermed area. The bermed area is sized to contain 110% of the tanks volume. Consequently, if there was a major leak, the bermed area will be able to contain all the fuel.

During routine operations, if a leak is detected the permittee will be required to monitor for the presence of diesel oil in the stormwater runoff. Discharges of diesel oil are prohibited.

H. State Certification

If the permittee achieves the above limits, State water quality standards are not expected to be violated.

I. Ocean Discharge Criteria Evaluation

Section 403 of the Clean Water Act requires EPA to decide on the basis of available information whether the discharge will cause unreasonable degradation of the marine environment.

The criteria to evaluate the discharge are listed in 40 CFR Part 125, Subpart M. After consideration of these criteria, it appears evident that if the permittee complies with the permit limits, the discharge will not cause unreasonable degradation.

J. Permit Term

The permit will expire in five (5) years.

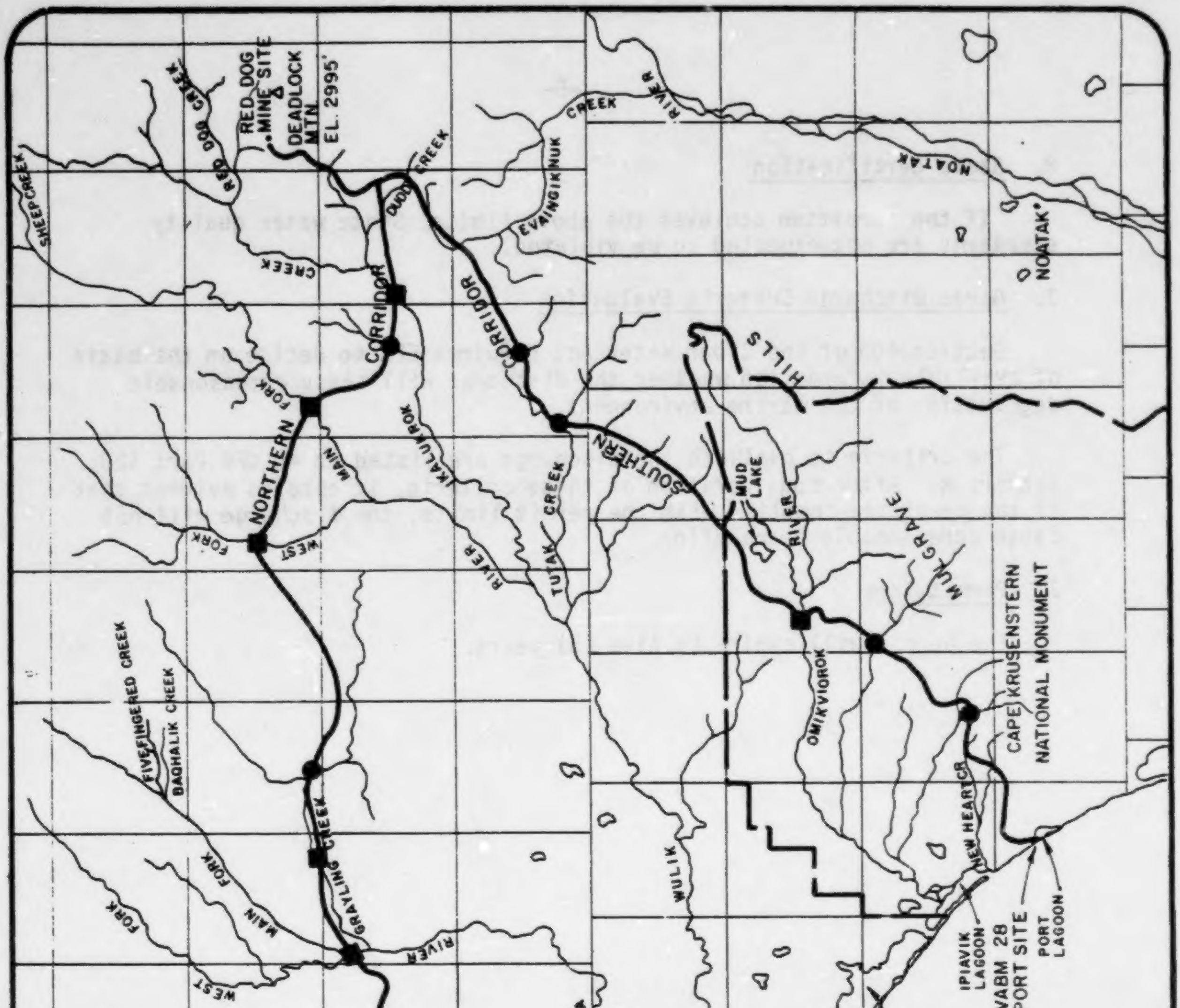
RED DOG MINE SITE
DEADLOCK MTN. EL. 2995'
RED DOG CREEK
SHEEP CREEK
CREEK
DUDD CREEK
CORRIDOR
NORTHERN
SOUTHERN
EVAINGIKNUK CREEK
NOATAK RIVER
NOATAK
HILLS
MUD LAKE
MAIN FORK
WEST FORK
IKALUKROK
TUTAK CREEK
RIVER
MULGRAVE
CAPE KRUSENSTERN NATIONAL MONUMENT
OMIKVIOROK
NEW HEART CR
FIVEFINGERED CREEK
BAGHALIK CREEK
GRAYLING CREEK
KIVALINA
WULIK
IPIAVIK LAGOON
VABM 28 PORT SITE
PORT LAGOON
IMIKRUK LAGOON
KIVALINA
SEA
CHUKCHI
KIVALINA LAGOON
ASIPAK RIVER
SINGOALIK RIVER
TUGAK LAGOON
TUGAK LAGOON PORT SITE
KAVRORAK LAGOON
6 miles
10 kilometers
N
LEGEND
MONUMENT BOUNDARY
TRANSPORTATION CORRIDOR
MAJOR BRIDGE CROSSING
MINOR BRIDGE CROSSING

FIGURE I
RED DOG PROJECT AREA

Permit No.: AK-004064-9
Application No.: AK-004064-9

United States Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

AUTHORIZATION TO DISCHARGE UNDER THE

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Water Pollution Control Act, as amended, (33 U.S.C. §1251 et seq; the "Act"),

Cominco Alaska

is authorized to discharge from a facility located 17 miles southeast of Kivalina, Alaska, to receiving waters named Chukchi Sea and an unnamed tributary to the Omikviorok River in accordance with discharge points, effluent limitations, monitoring requirements and other conditions set forth herein.

This permit shall become effective

This permit and the authorization to discharge shall expire at midnight,

Signed this day of

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Director, Water Division, Region 10
U.S. Environmental Protection Agency

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I. Effluent Limitations and Monitoring Requirements

A. Sewage Treatment Plant (Outfall 001)

During the period beginning on the effective date of this permit and lasting through the expiration date, the permittee is authorized to discharge from Outfall 001 in accordance with the following:

EFFLUENT CHARACTERISTICS	EFFLUENT LIMITATIONS Daily Avg	Weekly Avg	MONITORING REQUIREMENTS Frequency*	Sample Type
Flow	----	----	Weekly	Measurement
BOD_5	30 mg/l	45 mg/l	Monthly	Grab
Total Suspended Solids	30 mg/l	45 mg/l	Monthly	Grab
pH	pH shall not be less than 6.0 standard units, nor greater than 9.0 standard units.		Weekly	Grab

*During months of discharge only.

B. Port Site Sedimentation Pond (Outfall 002)

1. During the period beginning on the effective date of this permit and lasting through the expiration date, the permittee is authorized to discharge from Outfall 002 in accordance with the following:

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITATIONS Daily Avg.	Monthly Max.	MONITORING REQUIREMENTS Frequency*	Sample Type
Flow	----	----	Weekly	Measurement
Oil and Grease	10 mg/l	20 mg/l	Weekly	Grab
Total Suspended Solids	20 mg/l	30 mg/l	Weekly	Grab
Total Copper	0.15 mg/l	0.30 mg/l	Monthly	Grab
Total Zinc	0.5 mg/l	1.0 mg/l	Monthly	Grab
Total Lead	0.3 mg/l	0.6 mg/l	Monthly	Grab
Total Mercury	0.001 mg/l	0.002 mg/l	Monthly	Grab
Total Cadmium	0.05 mg/l	0.1 mg/l	Monthly	Grab
pH	pH shall not be less than 6.0 standard units, nor greater than 9.0 standard units.		Weekly	Grab

*During months of discharge only.

2. There shall be no discharge of diesel oil.

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C. Other Requirements

1. There shall be no discharge of floating solids or oily wastes which produce a sheen on the surface of the receiving water.

2. The permittee is only required to submit monitoring results for those months that discharge(s) has occurred.

3. The sample type, monitoring frequencies or monitoring program may be changed upon the review of the above monitoring results. This may include the addition of biomonitoring requirements.

D. Definitions

1. "Daily Average" ("Daily Avg.") shall mean the total units discharged during a monitoring month divided by the number of days in that period that the production or commercial facility was operating. Where less than daily sampling is required by this permit, this average shall be determined by the summation of the measured daily discharges divided by the number of days during the monitoring month when the measurements were made.

2. "Weekly Average" is the arithmetic mean of samples collected during a calendar week.

3. "Daily Maximum" ("Daily Max.") shall mean the maximum value attained on any day in a given monitoring month.

4. "Monitoring Month" shall mean the period consisting of the calendar weeks which end in a given calendar month.

5. A "24 hour composite" ("24 hr. Comp.") sample shall mean a flow-proportioned mixture of not less than 8 discrete aliquots. Each aliquot shall be a grab sample of not less than 100 ml and shall be collected and stored in accordance with procedures prescribed in the most recent edition of Standard Methods for the Examination of Water and Wastewater.

6. A "Grab" sample is a single sample or measurement taken at a specific time or over as short a period of time as is feasible.

7. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

8. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.

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E. Definitions

1. "Daily Average" ("Daily Avg.") shall mean the total units discharged during a monitoring month divided by the number of days in that period that the production or commercial facility was operating. Where less than daily sampling is required by this permit, this average shall be determined by the summation of the measured daily discharges divided by the number of days during the monitoring month when the measurements were made.

2. "Weekly Average" is the arithmetic mean of samples collected during a calendar week.

3. "Daily Maximum" ("Daily Max.") shall mean the maximum value attained on any day in a given monitoring month.

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5. A "24 hour composite" ("24 hr. Comp.") sample shall mean a flow-proportioned mixture of not less than 8 discrete aliquots. Each aliquot shall be a grab sample of not less than 100 ml and shall be collected and stored in accordance with procedures prescribed in the most recent edition of Standard Methods for the Examination of Water and Wastewater.

6. A "Grab" sample is a single sample or measurement taken at a specific time or over as short a period of time as is feasible.

7. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

8. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.

9. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

II. MONITORING, RECORDING AND REPORTING REQUIREMENTS

A. Representative Sampling. Samples taken in compliance with the monitoring requirements established under Part I shall be collected from the effluent stream prior to discharge into the receiving waters. Samples and measurements shall be representative of the volume and nature of the monitored discharge.

B. Monitoring Procedures. Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit.

C. Penalties for Tampering. The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate, any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

D. Reporting of Monitoring Results. Monitoring results shall be summarized each month on Discharge Monitoring Report (DMR) form (EPA No. 3320-1). The reports shall be submitted monthly and are to be postmarked by the 10th day of the following month. Legible copies of these, and all other reports, shall be signed and certified in accordance with the requirements of Part IV. G. Signatory Requirements, and submitted to the Director, Water Division and the State agency at the following addresses:

original to: United States Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

Attn: Water Compliance Section, Mail Stop 513

copy to: State of Alaska
Department of Environmental Conservation
Northern Regional Office
675 7th Avenue
P. O. Box 1601
Fairbanks, Alaska 99707

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E. Compliance Schedules. Reports of compliance or noncompliance with, or any progress reports on interim and final requirements contained in any Compliance Schedule of this permit (Part IA) shall be submitted no later than 10 days following each schedule date.

F. Additional Monitoring by the Permittee. If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR 136 or as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR. Such increased frequency shall also be indicated.

G. Records Contents. Records of monitoring information shall include:

a. The date, exact place, and time of sampling or measurements;

b. The individual(s) who performed the sampling or measurements;

c. The date(s) analyses were performed;

d. The individual(s) who performed the analyses;

e. The analytical techniques or methods used; and

f. The results of such analyses.

H. Retention of Records. The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application. This period may be extended by request of the Director at any time.

I. Twenty-four Hour Notice of Noncompliance Reporting.

1. The following occurrences of noncompliance shall be reported by telephone within 24 hours from the time the permittee becomes aware of the circumstances:

a. Any noncompliance which may endanger health or the environment.

b. Any unanticipated bypass which exceeds any effluent limitation in the permit. (See Part III. G. Bypass of Treatment Facilities.)

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c. Any upset which exceeds any effluent limitation in the permit. (See Part III. H. Upset Conditions.)

d. Violation of a maximum daily discharge limitation for any of the pollutants listed in the permit to be reported within 24 hours.

2. A written submission shall also be provided within 5 days of the time that the permittee becomes aware of the circumstances. The written description shall contain:

   a. A description of the noncompliance and its cause;

   b. The period of noncompliance, including exact dates and times;

   c. The estimated time noncompliance is expected to continue if it has not been corrected; and

   d. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

3. The Director may waive the written report on a case-by-case basis if the oral report has been received within 24 hours by the Water Compliance Section in Seattle, Washington by phone, (206) 442-1213.

4. Reports shall be submitted to the addresses in Part II. D. Reporting of Monitoring Results.

J. Other Noncompliance Reporting. Instances of noncompliance not required to be reported within 24 hours shall be reported at the time that monitoring reports for Part II. D. are submitted. The reports shall contain the information listed in Part II. I.2.

K. Inspection and Entry. The permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit, and

4. Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by the Clean Water Act, any substances or parameters at any location.

III. COMPLIANCE RESPONSIBILITIES

A. Duty to Comply. The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application. The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

B. Penalties for Violations of Permit Conditions. The Clean Water Act provides that any person who violates a permit condition implementing sections 301, 302, 306, 307, 308, 318, or 405 of the Clean Water Act is subject to a civil penalty not to exceed $10,000 per day of such violation. Any person who willfully or negligently violates permit conditions implementing sections 301, 302, 306, 307, or 308 of the Clean Water Act is subject to a fine of not less than $2,500, nor more than $25,000 per day of violation, or by imprisonment for not more than 1-year, or both. Except as provided in permit conditions on Part III. G. Bypass of Treatment Facilities and Part III. H. Upset Conditions, nothing in this permit shall be construed to relieve the permittee of the civil or criminal penalties for noncompliance.

C. Need to Halt or Reduce not a Defense. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

D. Duty to Mitigate. The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

E. Proper Operation and Maintenance. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

F. Removed Substances. Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering navigable waters.

G. Bypass of Treatment Facilities:

1. Bypass not exceeding limitations. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs 2. and 3. of this section.

2. Notice:

   a. Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least 10 days before the date of the bypass.

   b. Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required under Part II. I. Twenty-Four Hour Reporting.

3. Prohibition of bypass.

   a. Bypass is prohibited and the Director may take enforcement action against a permittee for a bypass, unless:

      (1) The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

      (2) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if the permittee could have installed adequate backup equipment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

      (3) The permittee submitted notices as required under paragraph 2. of this section.

   b. The Director may approve an anticipated bypass, after considering its adverse effects, if the Director determines that it will meet the three conditions listed above in paragraph 3.a. of this section.

III. COMPLIANCE RESPONSIBILITIES

A. Duty to Comply. The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application. The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

B. Penalties for Violations of Permit Conditions. The Clean Water Act provides that any person who violates a permit condition implementing sections 301, 302, 306, 307, 308, 318, or 405 of the Clean Water Act is subject to a civil penalty not to exceed $10,000 per day of such violation. Any person who willfully or negligently violates permit conditions implementing sections 301, 302, 306, 307, or 308 of the Clean Water Act is subject to a fine of not less than $2,500, nor more than $25,000 per day of violation, or by imprisonment for not more than 1-year, or both. Except as provided in permit conditions on Part III. G. Bypass of Treatment Facilities and Part III. H. Upset Conditions, nothing in this permit shall be construed to relieve the permittee of the civil or criminal penalties for noncompliance.

C. Need to Halt or Reduce not a Defense. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

D. Duty to Mitigate. The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

E. Proper Operation and Maintenance. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

F. Removed Substances. Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering navigable waters.

G. Bypass of Treatment Facilities:

1. Bypass not exceeding limitations. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs 2. and 3. of this section.

2. Notice:

   a. Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least 10 days before the date of the bypass.

   b. Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required under Part II. I. Twenty-Four Hour Reporting.

3. Prohibition of bypass.

   a. Bypass is prohibited and the Director may take enforcement action against a permittee for a bypass, unless:

      (1) The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

      (2) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if the permittee could have installed adequate backup equipment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

      (3) The permittee submitted notices as required under paragraph 2. of this section.

   b. The Director may approve an anticipated bypass, after considering its adverse effects, if the Director determines that it will meet the three conditions listed above in paragraph 3.a. of this section.

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H. Upset Conditions

1. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of paragraph 2. of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

2. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

   a. An upset occurred and that the permittee can identify the specific cause(s) of the upset;

   b. The permitted facility was at the time being properly operated; and

   c. The permittee submitted notice of the upset as required under Part II. I. Twenty-Four Hour Notice of Noncompliance Reporting.

   d. The permittee complied with any remedial measures required under Part III. D. Duty to Mitigate.

3. Burden of proof. In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

I. Toxic Pollutants. The permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

IV. GENERAL REQUIREMENTS

A. Changes in Discharge of Toxic Substances. Notification shall be provided to the Director as soon as the permittee knows of, or has reason to believe:

1. That any activity has occurred or will occur which would result in the discharge of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

a. One hundred micrograms per liter (100 ug/l);

b. Two hundred micrograms per liter (200 ug/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 ug/l) for 2,4-dinitrophenol and for 2-methyl-4, 6-dinitrophenol; and one milligram per liter (1 mg/l) for antimony;

c. Five (5) times the maximum concentration value reported for that pollutant in the permit application;

2. That the permittee has begun or expects to begin to use or manufacture as an intermediate or final product or byproduct any toxic pollutant which was not reported in the permit application.

B. Planned Changes. The permittee shall give notice to the Director, as soon as possible, of any planned physical alterations or additions to the permitted facility. The permittee shall also give advance notice of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

C. Permit Actions. This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

D. Duty to Reapply. If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. The application should be submitted at least 180 days before the expiration date of this permit.

E. Duty to Provide Information. The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit.

F. Other Information. When the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or any report to the Director, it shall promptly submit such facts or information.

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G. Signatory Requirements. All applications, reports or information submitted to the Director shall be signed and certified.

1. All permit applications shall be signed as follows:

   a. For a corporation: by a responsible corporate officer;

   b. For a partnership or sole proprietorship: by a general partner or the proprietor, respectively.

   c. For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official.

2. All reports required by the permit and other information requested by the Director shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

   a. The authorization is made in writing by a person described above and submitted to the Director.

   b. The authorization specified either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, or position of equivalent responsibility. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.)

3. Changes to authorization. If an authorization under paragraph IV. G. 2. is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph IV. G. 2. must be submitted to the Director prior to or together with any reports, information, or applications to be signed by an authorized representative.

4. Certification. Any person signing a document under this section shall make the following certification:

   "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

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H. Penalties for Falsification of Reports. The Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

I. Availability of Reports. Except for data determined to be confidential under 40 CFR Part 2, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the State water pollution control agency and the Director. As required by the Act, permit applications, permits and effluent data shall not be considered confidential.

J. Oil and Hazardous Substance Liability. Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Act.

K. Property Rights. The issuance of this permit does not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

L. Severability. The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

M. Transfers. This permit may be automatically transferred to a new permittee if:

1. The current permittee notifies the Director at least 30 days in advance of the proposed transfer date;

2. The notice includes a written agreement between the existing and new permittees containing a specific date for transfer of permit responsibility, coverage, and liability between them; and

3. The Director does not notify the existing permittee and the proposed new permittee of his or her intent to modify, or revoke and reissue the permit. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in paragraph 2. above.

Appendix 5

Department of the Army Public Notice and Section 404(b)(1) Evaluation

US Army Corps of Engineers

Alaska District
Regulatory Functions Branch
Pouch 898
Anchorage, Alaska 99506

Public Notice of Application for Permit

PUBLIC NOTICE DATE: March 16, 1984

REFERENCE NUMBER: 071-OYD-4-840012

WATERWAY NUMBER: Chukchi Sea 11

Interested parties are hereby notified that an application has been received for a Department of the Army permit for certain work in waters of the United States, as described below and shown on the attached plan.

APPLICANT: Cominco Alaska, Incorporated

LOCATION: Red Dog Mine, sec. 19, T. 13 N., R. 18 W., K.R.M.

WORK: 1) Tailing Dam: Place approximately 2,800,000 cubic yards of dredged and fill material in the south fork of Red Dog Creek and adjacent wetlands to construct a tailing dam. The dam will be 150 feet high and 30 feet wide at the crest, with an embankment approximately 2,400 feet long. The upstream slope will be 2:1 with downstream side slope of 4:1. A spillway will be constructed to meet the 10-year, 24-hour rainfall event.
2) Access Road: Place approximately 177,408 cubic yards of fill material in wetlands to construct a gravel access road connecting the mill site, tailing dam, and mine. The 2.1 mile road will be constructed 6 feet high and 60 feet wide at the crown with 2:1 side slopes.

PURPOSE: The purpose of these activities is to construct support facilities for the efficient and environmentally safe operation of the Red Dog Mine. All activities will be located on private lands.

ADDITIONAL INFORMATION: The Environmental Protection Agency (EPA) is preparing an Environmental Impact Statement (EIS) for the Red Dog Mine project. The Alaska District Corps of Engineers is a coorperating agency in the EIS. A permit decision regarding the road and tailing dam will not be made until after the Final EIS has been prepared. This public notice reflects the applicant's preferred alternative. Other alternatives are being considered in the EIS process and a discussion of these alternatives can be found in Chapter III of the EIS.

AUTHORITY: This permit will be issued or denied under the following authorities:

(X) Discharge dredged or fill material into waters of the United States - Section 404, Clean Water Act (33 U.S.C. 1344).

WATER QUALITY CERTIFICATION: A permit for the described work will not be issued until a certification or waiver of certification as required under Section 401 of the Clean Water Act (Public Law 95-217), has been received from the Alaska Department of Environmental Conservation.

PUBLIC HEARING: The Corps of Engineers and the Environmental Protection Agency will hold joint public hearings on the Draft EIS. The dates and locations of these public hearings can be found in the Draft EIS.

CULTURAL RESOURCES: The applicant's perferred alternative may affect cultural resources located within and adjacent to Cape Krusentstern National Monument. Formal consultation pursuant to Section 106 of the National Historic Preservation Act (33 CFR 800) is required.

ENDANGERED SPECIES: Preliminarily, this described activity will not affect endangered species, or their critical habitat designated as endangered or threatened, under the Endangered Species Act of 1973 (87 Stat. 844). Formal consultation under Section 7 of the Act is not required for the described activity.

FLOOD PLAIN MANAGEMENT: Evaluation of the described activity will include conformance with appropriate State or local flood plain standards; consideration of alternative sites and methods of accomplishment; and weighing of the positive, concentrated and dispersed, and short and long-term impacts on the flood plain.

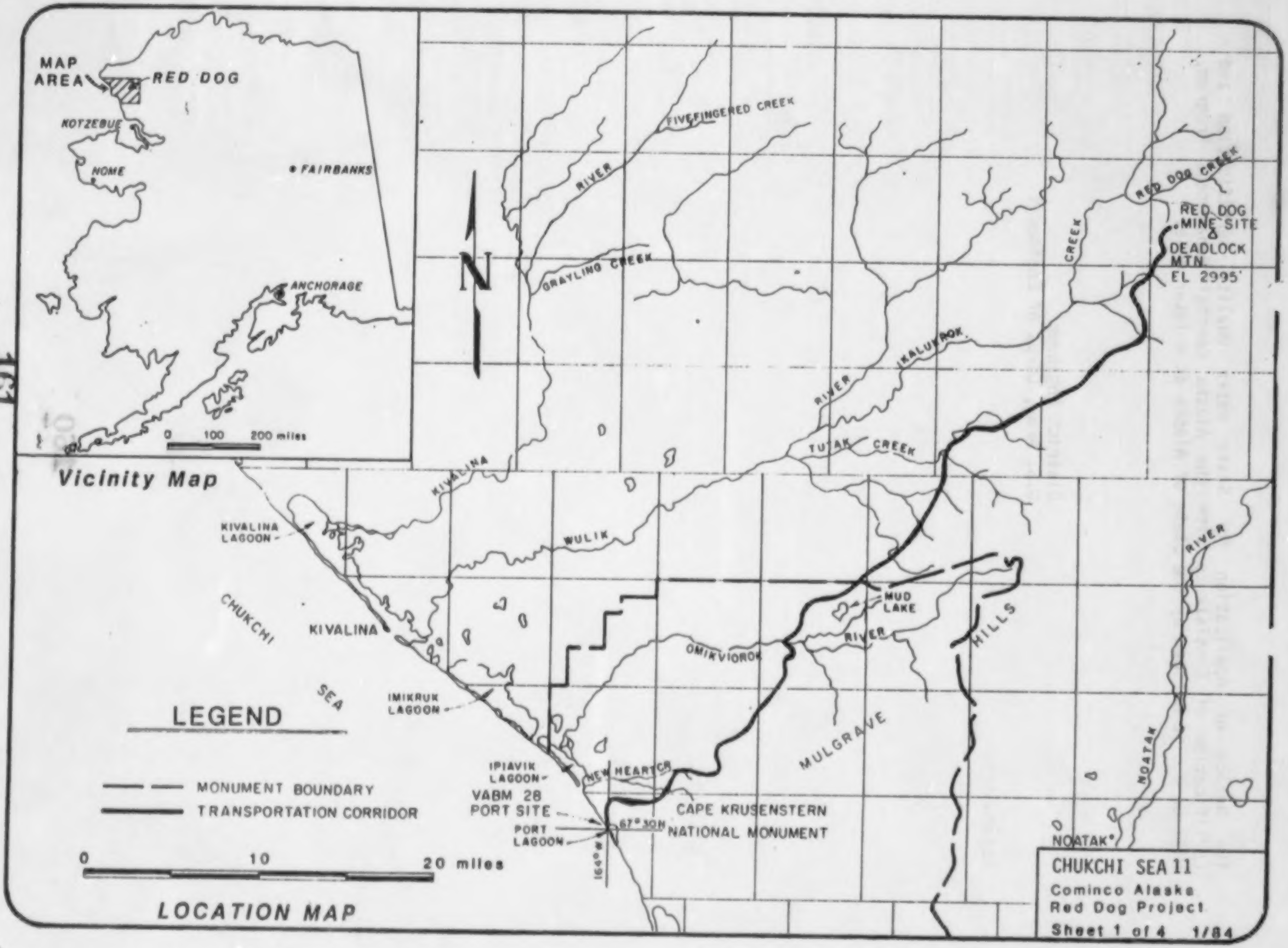
EVALUATION: The decision whether to issue a permit will be based on an evaluation of the probable impact including cumulative impacts of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefit which reasonably may be expected to accrue from the proposals must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the proposal will be considered including the cumulative effects thereof; among these are conservation, economics, aesthetics, general environmental concerns, wetlands, cultural values, fish and wildlife values, flood hazards, flood plain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, and, in general, the needs and welfare of the people.

Comments on the described work, with the reference number, should reach this office no later than 30 days after the publication of the notice of availability of the Final EIS to become part of the record and be considered in the permit decision. Copies of any comments should be sent to Mr. Bill Riley, Environmental Evaluation Branch (M/S 443), Environmental Protection Agency, 1200 Sixth Avenue, Seattle, Washington 98101. If further information is desired concerning this notice, contact Mr. Joe Williamson at (907) 552-4942 or 279-6713.

The Notice of Application for State Water Quality Certification and Certification of Consistency with the Alaska Coastal Management Program, will be public noticed by the State of Alaska at a later date.

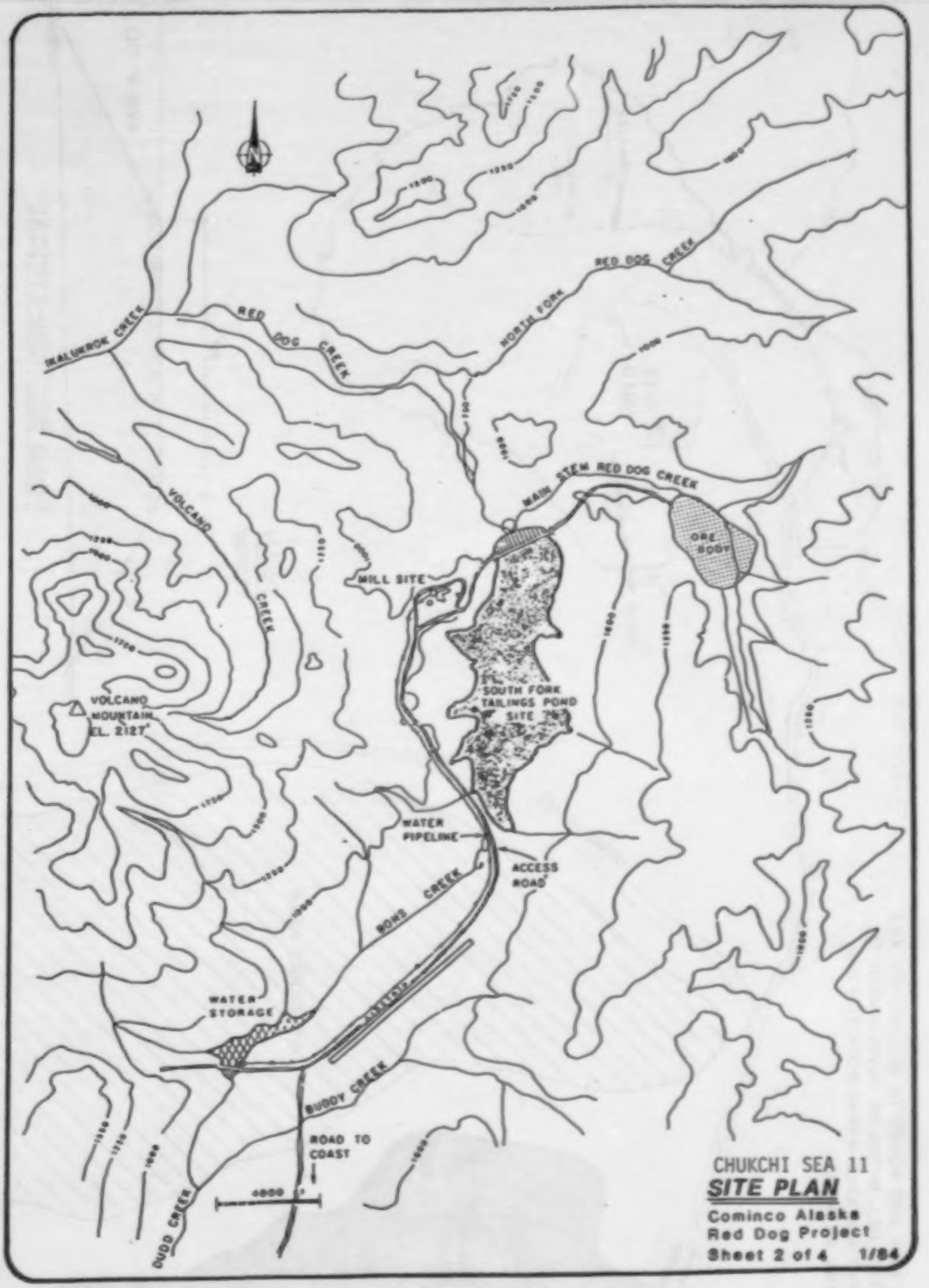
District Engineer
U.S. Army, Corps of Engineers

Attachments


MAP AREA
RED DOG
KOTZEBUE
NOME
FAIRBANKS
ANCHORAGE
0 100 200 miles
Vicinity Map
N
FIVEFINGERED CREEK
RIVER
GRAYLING CREEK
KIVALINA
WULIK
IKALUKROK
RIVER
TUTAK CREEK
CREEK
RED DOG CREEK
RED DOG MINE SITE & DEADLOCK MTN. EL 2995'
KIVALINA LAGOON
CHUKCHI SEA
KIVALINA
IMIKRUK LAGOON
IPIAVIK LAGOON
VABM 28 PORT SITE
PORT LAGOON
NEW HEART CR.
67° 30'N
164°W
CAPE KRUSENSTERN NATIONAL MONUMENT
OMIKVIOROK
RIVER
MUD LAKE
MULGRAVE
HILLS
NOATAK RIVER
NOATAK
LEGEND
MONUMENT BOUNDARY
TRANSPORTATION CORRIDOR
0 10 20 miles

CHUKCHI SEA 11
Cominco Alaska
Red Dog Project
Sheet 1 of 4 1/84

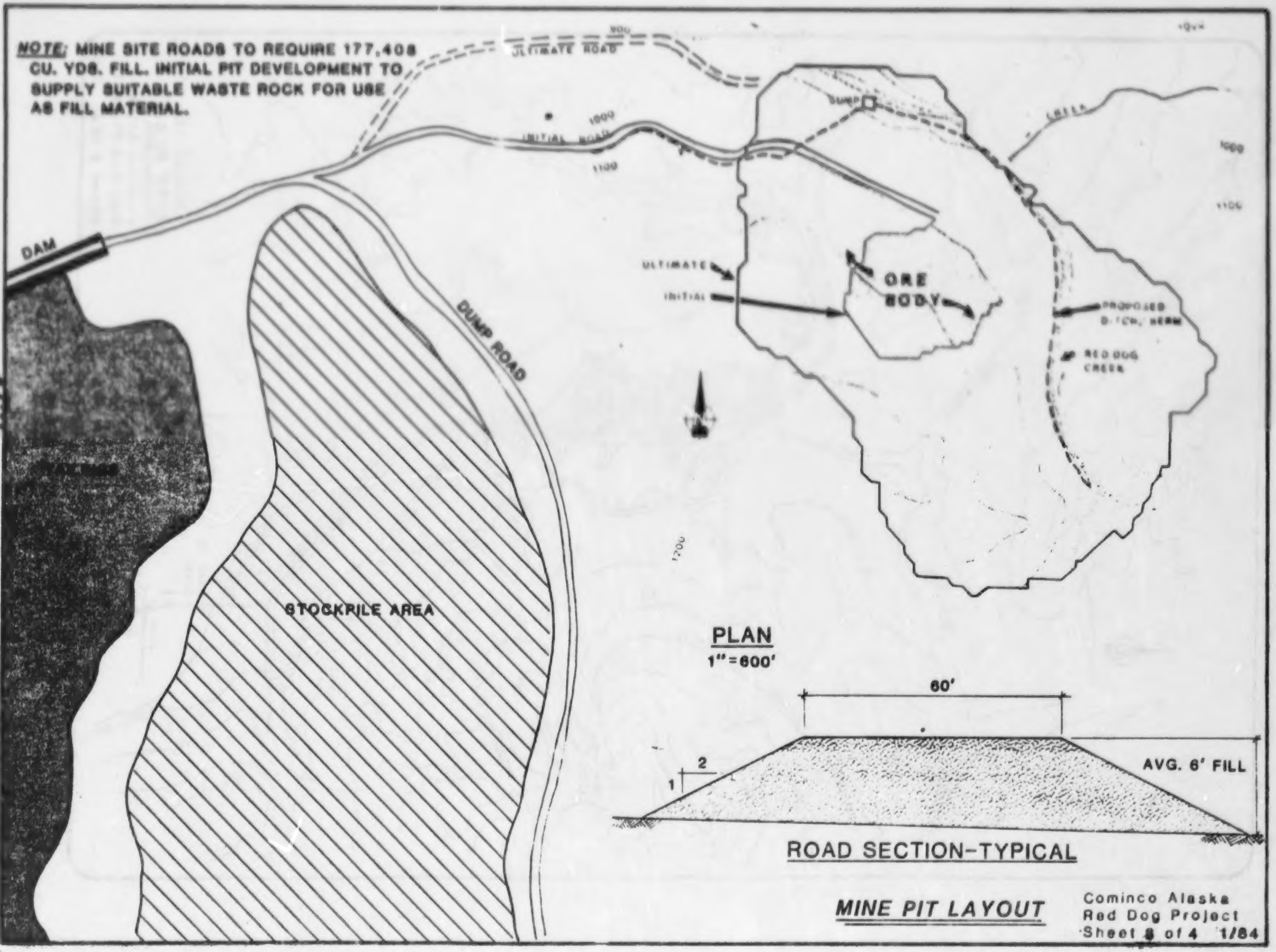
LOCATION MAP


IKALUKROK CREEK
RED DOG CREEK
NORTH FORK RED DOG CREEK
MAIN STEM RED DOG CREEK
VOLCANO CREEK
MILL SITE
ORE BODY
SOUTH FORK TAILINGS POND SITE
VOLCANO MOUNTAIN EL. 2127'
WATER PIPELINE
ACCESS ROAD
BONS CREEK
WATER STORAGE
BUDDY CREEK
ROAD TO COAST
DUDD CREEK
4000 ft

CHUKCHI SEA 11

SITE PLAN

Cominco Alaska
Red Dog Project
Sheet 2 of 4 1/84


DAM
DUMP ROAD
STOCKPILE AREA
ULTIMATE ROAD
INITIAL ROAD
800
1000
1100
1200
DUMP
ULTIMATE
INITIAL
ORE BODY
PROPOSED DITCH/BERM
RED DOG CREEK
CREEK
60'
2
1
AVG. 6' FILL

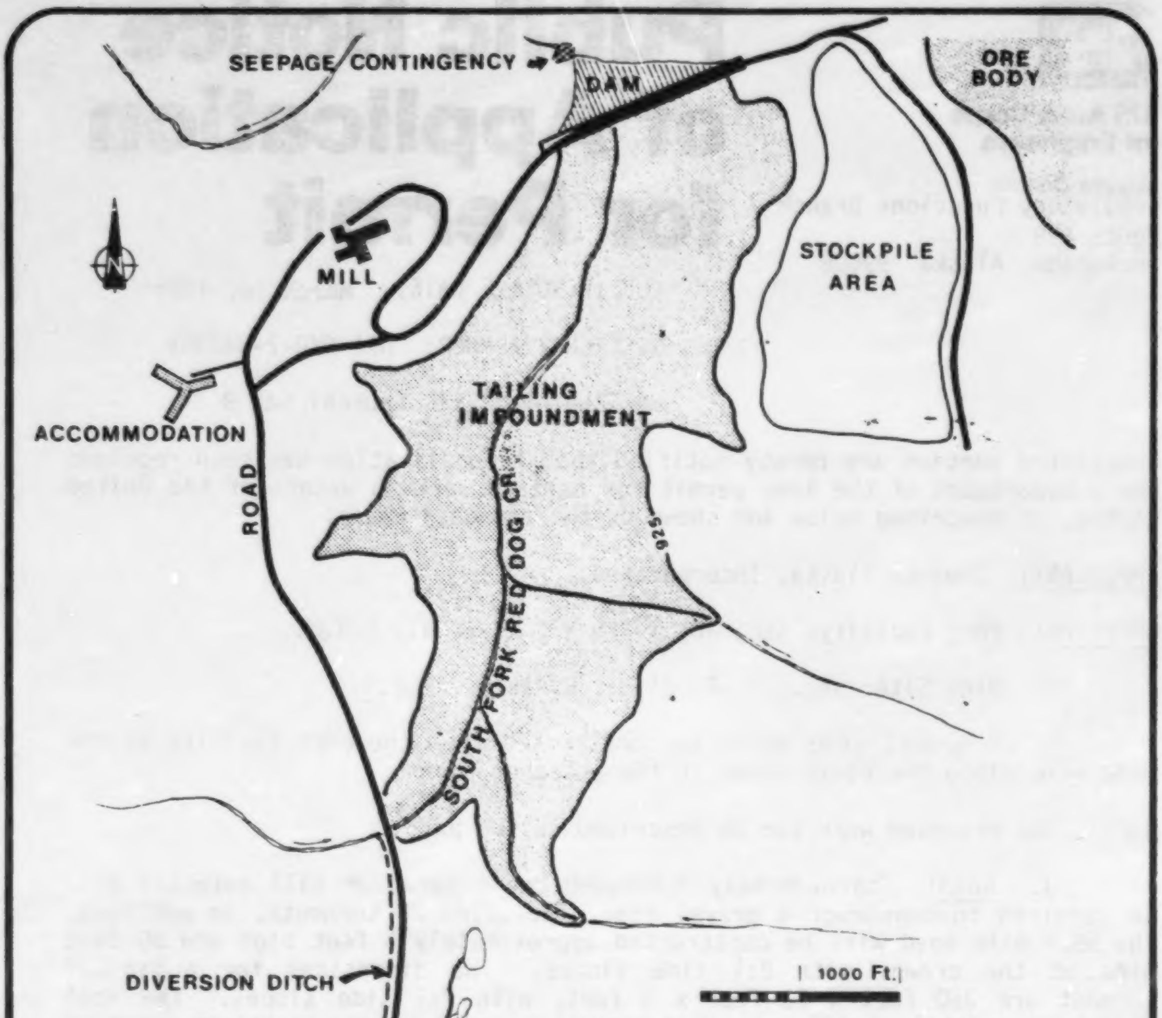
NOTE: MINE SITE ROADS TO REQUIRE 177,408 CU. YDS. FILL. INITIAL PIT DEVELOPMENT TO SUPPLY SUITABLE WASTE ROCK FOR USE AS FILL MATERIAL.

PLAN
1" = 600'

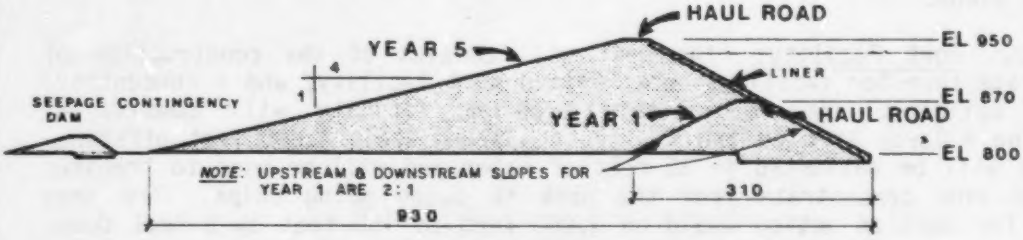
ROAD SECTION-TYPICAL

MINE PIT LAYOUT

Cominco Alaska
Red Dog Project
Sheet 3 of 4 1/84


SEEPAGE CONTINGENCY
DAM
ORE BODY
MILL
STOCKPILE AREA
TAILING IMPOUNDMENT
ACCOMMODATION
ROAD
SOUTH FORK RED DOG CR.
925
DIVERSION DITCH
1000 Ft.

IMPOUNDMENT-PLAN


HAUL ROAD
EL 950
YEAR 5
4
1
LINER
EL 870
SEEPAGE CONTINGENCY DAM
YEAR 1
HAUL ROAD
EL 800
NOTE: UPSTREAM & DOWNSTREAM SLOPES FOR YEAR 1 ARE 2:1
310
930

DAM SECTION

1"=200'

FILL REQUIREMENTS (cu. yds.)
(MINE WASTE MATERIAL)

YEAR 1	**255,000**
YEAR 5	**2,800,000**

CHUKCHI SEA 11

TAILING IMPOUNDMENT

Cominco Alaska
Red Dog Project
Sheet 4 of 4 1/84

US Army Corps of Engineers

Alaska District
Regulatory Functions Branch
Pouch 898
Anchorage, Alaska 99506

Public Notice of Application for Permit

PUBLIC NOTICE DATE: March 16, 1984

REFERENCE NUMBER: 071-OYD-2-830359

WATERWAY NUMBER: Chukchi Sea 9

Interested parties are hereby notified that an application has been received for a Department of the Army permit for certain work in waters of the United States, as described below and shown on the attached plans.

APPLICANT: Cominco Alaska, Incorporated

LOCATION: Port Facility: sec. 10, T. 25 N., R. 24 W., K.R.M.

Mine Site: sec. 19, T. 31 N., R. 18 W., K.R.M.

A gravel road would be constructed from the port facility to the mine site along the route shown in the attached plans.

WORK: The proposed work can be described in two parts:

1. Road: Approximately 3,980,000 cubic yards of fill material will be required to construct a gravel road, including 28 turnouts, in wetlands. The 56.7 mile road will be constructed approximately 6 feet high and 30 feet wide at the crown, with 2:1 side slopes. The dimensions for a typical turnout are 350 feet x 20 feet x 6 feet, with 2:1 side slopes. The road will have a total of 175 culverted crossings and 2 bridge crossings. Gravel material for the road and turnouts will be obtained from several borrow sites. These borrow sites will be permitted at a later date when the exact locations are known. Possible borrow site locations have been shown on the attached plans.

2. Port Facility: The port will consist of the construction of concentrate transfer facility, dock, upland port facility, and a concentrate storage building. The concentrate transfer facility will consist of ballasting a large ship on the sea floor approximately 4,000 feet offshore. The ship will be ballasted in 35 feet of water and will be used to transfer lead and zinc concentrate from the dock to ocean going ships. The area dredged for such an action would be 1,000 feet by 150 feet by 5 feet deep, with the dredged material pumped into the ship's wing tanks to act as ballast (total of 25,000 cubic yards). In addition, 1,000 feet to the north, an area 1,000 feet by 200 feet by 10 feet deep will be dredged to supply ballast for the tanker (total of 75,000 cubic yards). There would be no onshore storage of dredged material. The dock will be 400 feet long and extend to 12 feet of water offshore, with 3:1 side slopes. Twenty-nine thousand (29,000) cubic yards of fill would be needed for the dock, including armor rock located at the toe of the structure. The upland port

site will be constructed in wetlands adjacent to the Chukchi Sea and will be used as a staging area for concentrate shipping, the movement of mine supplies, and building materials. The pad will be 510 feet by 265 feet and 10 feet deep. The total fill required is 63,000 cubic yards. The concentrate storage building will be located on the excavated barrow site approximately 2.5 miles from the shore side facility. The building will be 912 feet by 180 feet by 80 feet tall. No fill will be required. The opening of the port lagoon would require the dredging of an opening which would be 60 feet by 370 feet by 12 feet. A total of 15,000 cubic yards of material would be moved. This would be done to allow access to the lagoon for the construction barge to be used in the initial development of the road and port.

PURPOSE: The purpose is to develop a road and port facility for the construction and operation of the Red Dog Mine. The road will be an industrial use road constructed to carry 150 ton trucks which will move lead/zinc concentrate from the mine to the port. The road would carry up to 12 truck trips per day plus other assorted mine related vehicle trips. The port would function approximately 4 months of the year and would act as the incoming and outgoing point for all material for the Red Dog Mine.

ADDITIONAL INFORMATION: The Environmental Protection Agency (EPA) is preparing an Environmental Impact Statement (EIS) for the Red Dog Mine project, including the gravel road and port facility. The Alaska District Corps of Engineers is a coorperating agency in the EIS. A permit decision regarding the road and port facility will not be made until after the Final EIS has been prepared. This public notice reflects the applicant's preferred alternative. Other alternatives are being considered in the EIS process and a discussion of these alternatives can be found in Chapter III of the EIS.

AUTHORITY: This permit will be issued or denied under the following authorities:

(X) Perform work in or affecting navigable waters of the United States
Section 10, River and Harbor Act 1899 (33 U.S.C. 403).

(X) Discharge dredged or fill material into waters of the United States
Section 404, Clean Water Act (33 U.S.C. 1344).

(X) Title XI, Alaska National Interest Lands Conservation Act (PL 96-487; 94 Stat. 2371).

WATER QUALITY CERTIFICATION: A permit for the described work will not be issued until a certification or waiver of certification as required under Section 401 of the Clean Water Act (Public Law 95-217), has been received from the Alaska Department of Environmental Conservation.

COASTAL ZONE MANAGEMENT ACT CERTIFICATION: Section 307(c)(3) of the Coastal Zone Management Act of 1972, as amended by 16 U.S.C. 1456(c)(3), requires the applicant to certify that the described activity affecting land or water uses in the Coastal Zone complies with the Alaska Coastal Management Program. A permit will not be issued until the Office of Management and Budget, Division of Governmental Coordination has concurred with the applicant's certification.

PUBLIC HEARING: The Corps of Engineers and the Environmental Protection Agency will hold joint public hearings on the Draft EIS. The dates and locations of these public hearings can be found in the Draft EIS.

CULTURAL RESOURCES: The applicant's perferred alternative may affect cultural resources located within and adjacent to Cape Krusentstern National Monument. Formal consultation pursuant to Section 106 of the National Historic Preservation Act (33 CFR 800) is required.

ENDANGERED SPECIES: The proposed action may affect threatened or endangered species or their critical habitats. Formal consultation with the U.S. Fish and Wildlife Service and National Marine Fisheries Service, under Section 7 of the Endangered Species Act of 1973 (87 Stat. 844), is required.

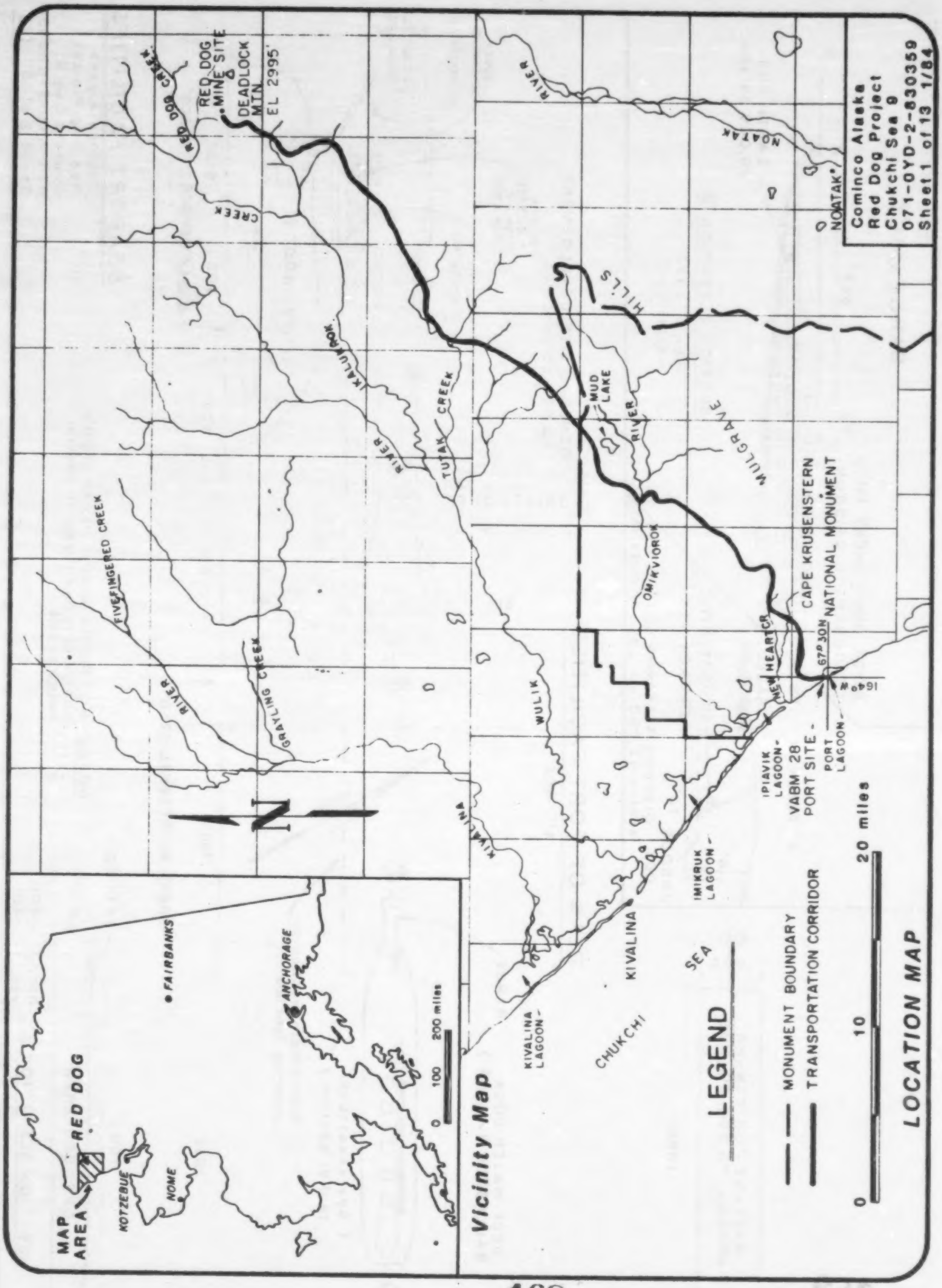
FLOOD PLAIN MANAGEMENT: Evaluation of the described activity will include conformance with appropriate State or local flood plain standards; consideration of alternative sites and methods of accomplishment; and weighing of the positive, concentrated and dispersed, and short and long-term impacts on the flood plain.

EVALUATION: The decision whether to issue a permit will be based on an evaluation of the probable impact including cumulative impacts of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefit which reasonably may be expected to accrue from the proposals must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the proposal will be considered including the cumulative effects thereof; among these are conservation, economics, aesthetics, general environmental concerns, wetlands, cultural values, fish and wildlife values, flood hazards, flood plain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, and, in general, the needs and welfare of the people.

Comments on the described work, with the reference number, should reach this office no later than 30 days after the publication of the notice of availability of the Final EIS to become part of the record and be considered in the permit decision. Copies of any comments should be sent to Mr. Bill Riley, Environmental Evaluation Branch (M/S 443), Environmental Protection Agency, 1200 Sixth Avenue, Seattle, Washington 98101. If further information is desired concerning this notice, contact Mr. Joe Williamson at (907) 552-4942 or 279-6713.

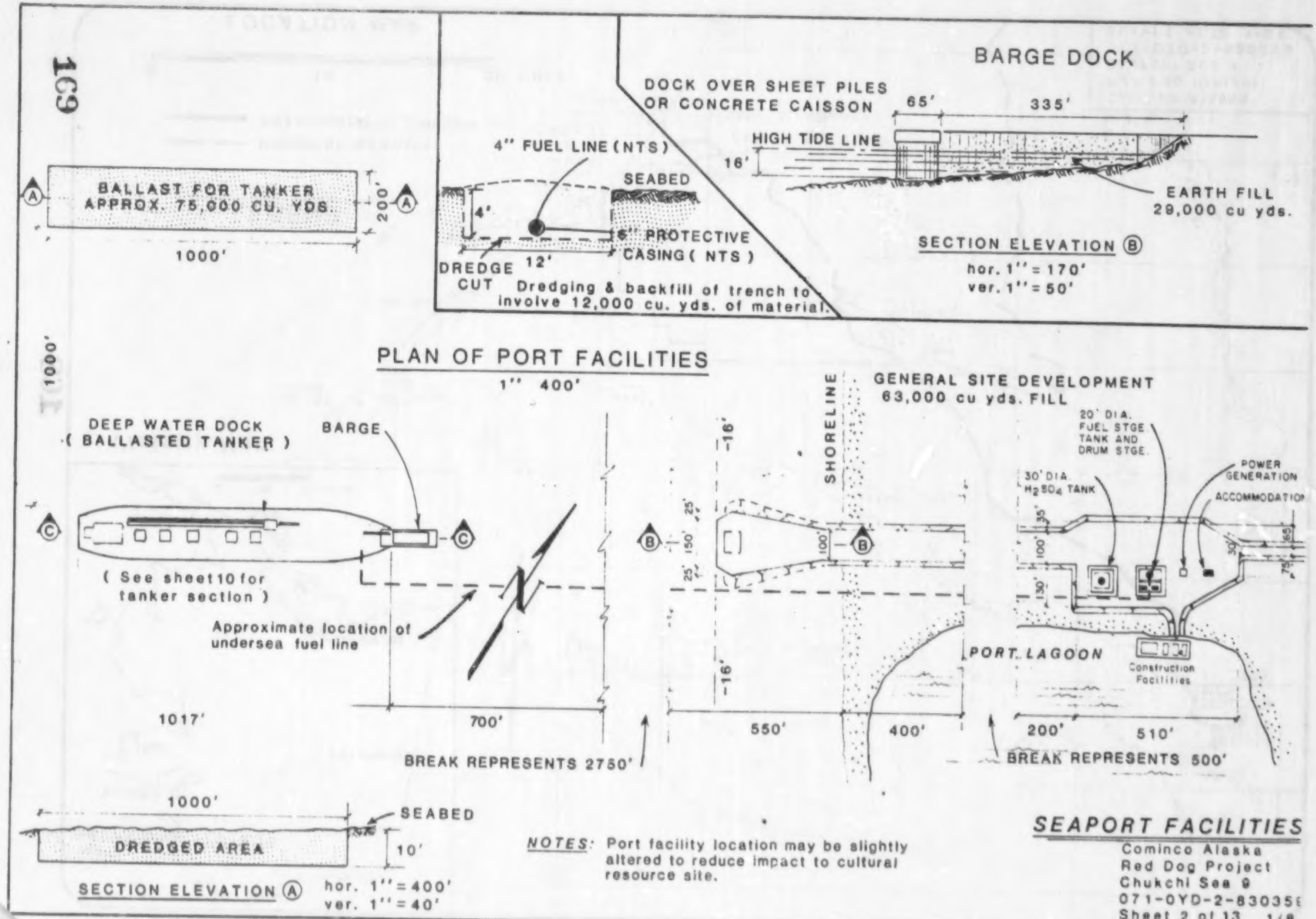
The Notice of Application for both State Water Quality Certification and Certification of Consistency with the Alaska Coastal Zone Management Program will be public noticed by the State of Alaska at a later date.

District Engineer
U.S. Army, Corps of Engineers


RED DOG MINE SITE
DEADLOCK MTN
EL 2995'
RED DOG CREEK
CREEK
IKALUKROK
TUTAK CREEK
RIVER
FIVEFINGERED CREEK
RIVER
GRAYLING CREEK
WULIK
KIVALINA
MUD LAKE
HILLS
RIVER
MULGRAVE
OMIKVIOROK
NEW HEART CR.
CAPE KRUSENSTERN
NATIONAL MONUMENT
67°30N
164°W
NOATAK
RIVER
NOATAK
KIVALINA LAGOON
KIVALINA
IMIKRUK LAGOON
IPIAVIK LAGOON
VABM 28
PORT SITE
PORT LAGOON
CHUKCHI
SEA
N
MAP AREA
RED DOG
KOTZEBUE
NOME
FAIRBANKS
ANCHORAGE
0
100
200 miles
Vicinity Map
LEGEND
MONUMENT BOUNDARY
TRANSPORTATION CORRIDOR
0
10
20 miles

LOCATION MAP

Cominco Alaska
Red Dog Project
Chukchi Sea 9
071-0YD-2-830359
Sheet 1 of 13 1/84


BARGE DOCK
DOCK OVER SHEET PILES
OR CONCRETE CAISSON
65'
335'
HIGH TIDE LINE
16'
EARTH FILL
29,000 cu yds.
SECTION ELEVATION Ⓑ
hor. 1'' = 170'
ver. 1'' = 50'
4'' FUEL LINE (NTS)
SEABED
4'
12'
6'' PROTECTIVE
CASING (NTS)
DREDGE
CUT
Dredging & backfill of trench to
involve 12,000 cu. yds. of material.
Ⓐ
BALLAST FOR TANKER
APPROX. 75,000 CU. YDS.
200'
Ⓐ
1000'
PLAN OF PORT FACILITIES
1'' 400'
1000'
DEEP WATER DOCK
(BALLASTED TANKER)
BARGE
Ⓒ
Ⓒ
(See sheet 10 for
tanker section)
Approximate location of
undersea fuel line
1017'
700'
BREAK REPRESENTS 2750'
Ⓑ
25
150
25
-16'
-16'
100
Ⓑ
SHORELINE
550'
400'
GENERAL SITE DEVELOPMENT
63,000 cu yds. FILL
20' DIA.
FUEL STGE.
TANK AND
DRUM STGE.
30' DIA.
H_2SO_4 TANK
POWER
GENERATION
ACCOMMODATIO
35'
100'
130'
30'
65
75
PORT LAGOON
Construction
Facilities
200'
510'
BREAK REPRESENTS 500'
1000'
SEABED
DREDGED AREA
10'
SECTION ELEVATION Ⓐ
hor. 1'' = 400'
ver. 1'' = 40'

NOTES: Port facility location may be slightly altered to reduce impact to cultural resource site.

SEAPORT FACILITIES

Cominco Alaska
Red Dog Project
Chukchi Sea 9
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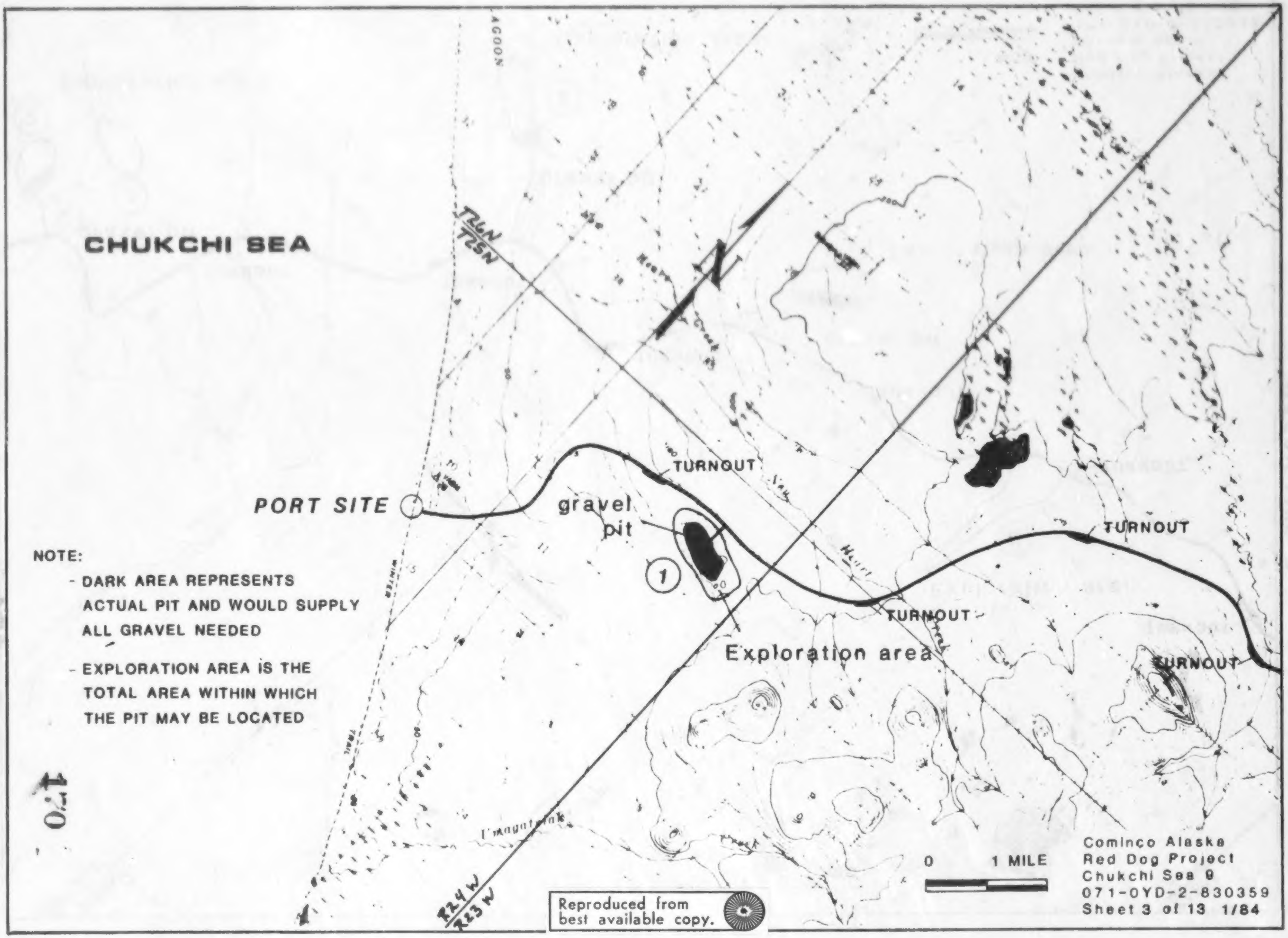
CHUKCHI SEA
AGOON
T26N
T25N
PORT SITE
WINTER
TRAIL
gravel pit
1
TURNOUT
TURNOUT
TURNOUT
TURNOUT
Exploration area
Creek
R24W
R23W
0
1 MILE
MATCH LINE A

NOTE:
- DARK AREA REPRESENTS ACTUAL PIT AND WOULD SUPPLY ALL GRAVEL NEEDED
- EXPLORATION AREA IS THE TOTAL AREA WITHIN WHICH THE PIT MAY BE LOCATED

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Chukchi Sea 9
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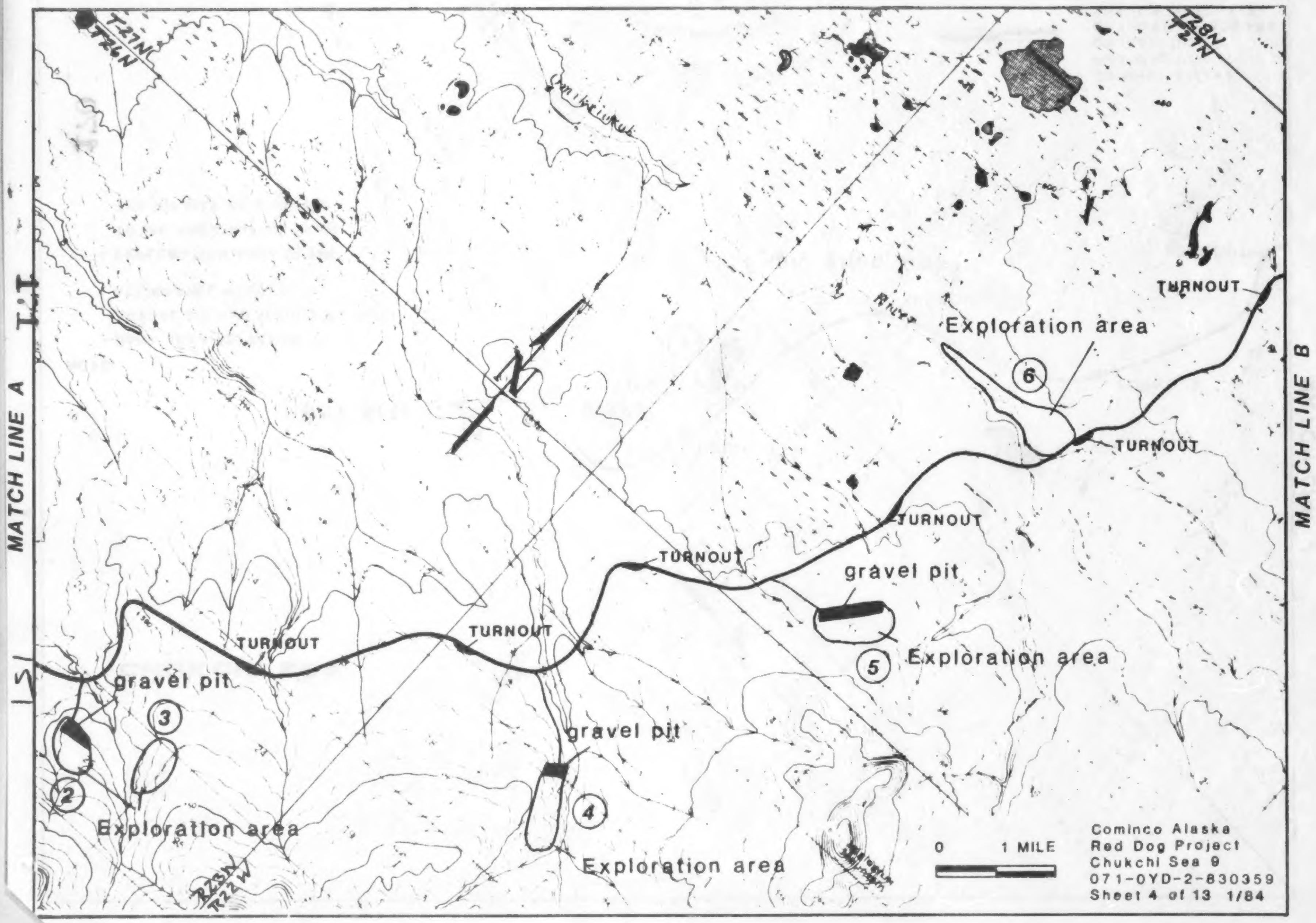
MATCH LINE A
MATCH LINE B
T27N
T26N
T28N
T27N
R23W
R22W
N
Omikviorok
River
TURNOUT
TURNOUT
TURNOUT
TURNOUT
TURNOUT
TURNOUT
gravel pit
gravel pit
gravel pit
Exploration area
Exploration area
Exploration area
Exploration area
Exploration area
2
3
4
5
6
0
1 MILE

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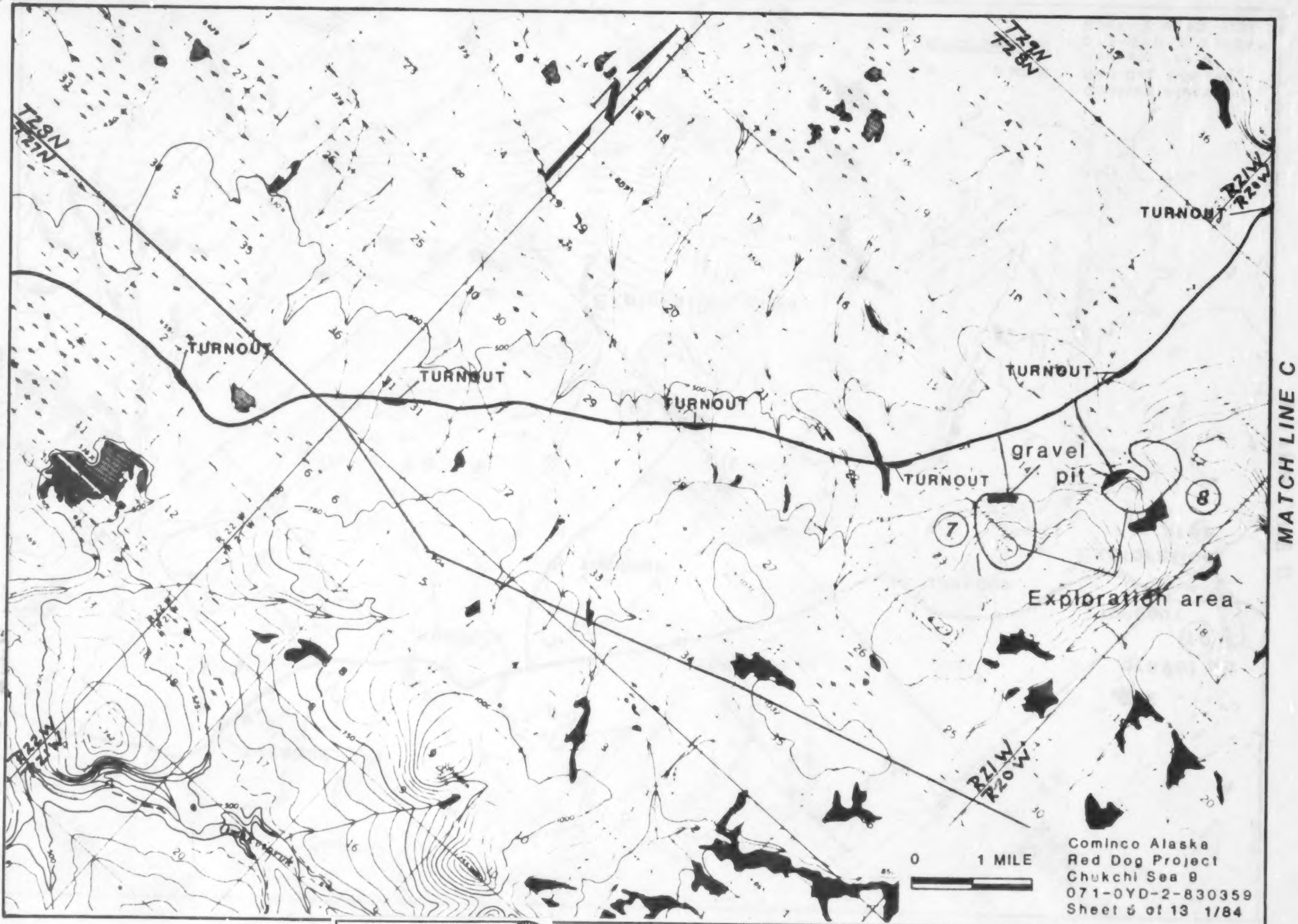
MATCH LINE C
TURNOUT
TURNOUT
TURNOUT
TURNOUT
TURNOUT
TURNOUT
gravel pit
⑦
⑧
Exploration area
T29N
T28N
T28N
T27N
R21W
R20W
R21W
R20W
R22W
R21W
0
1 MILE
Cominco Alaska
Red Dog Project
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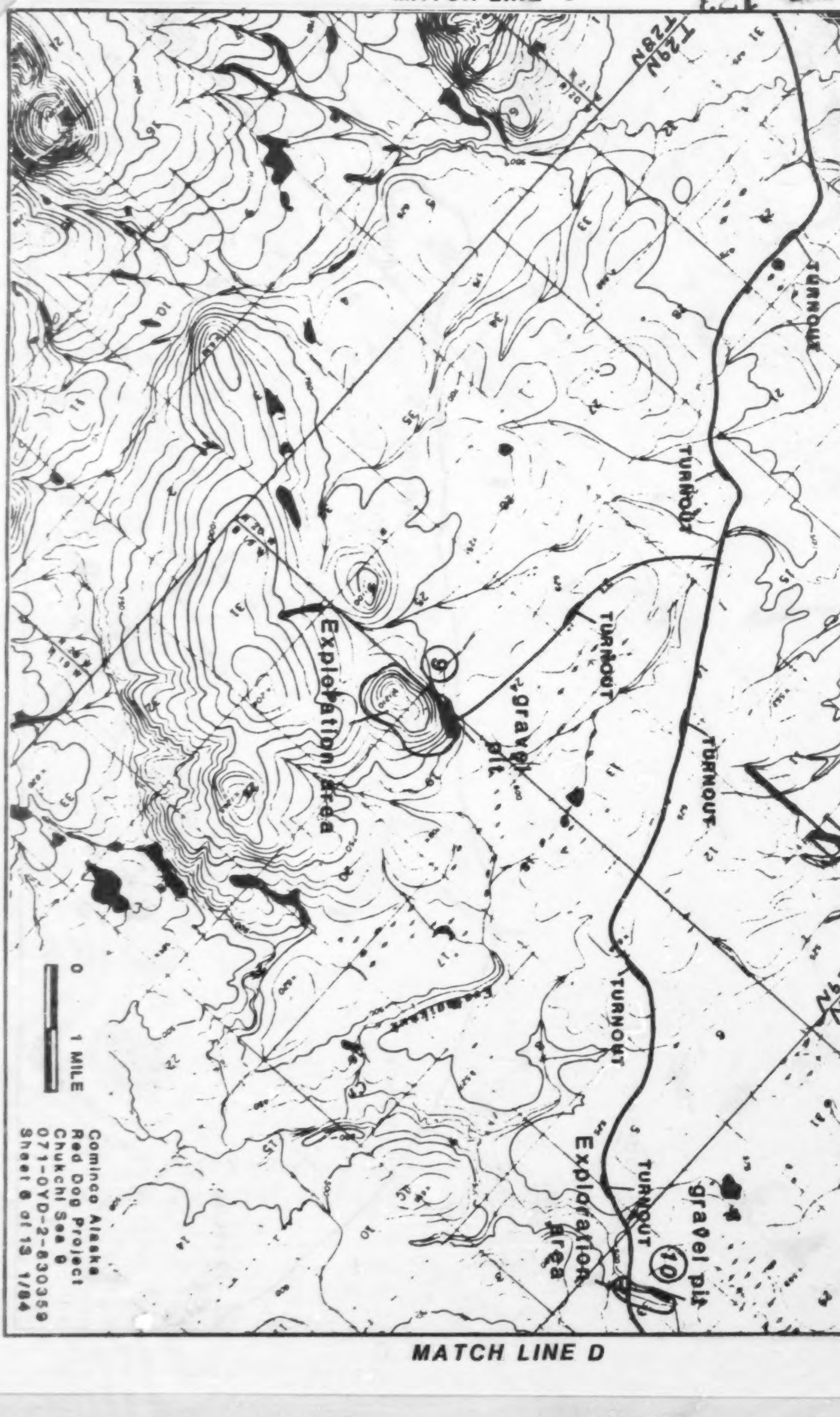
MATCH LINE C


T29N
T28N
R22W
R17W
TURNOUT
TURNOUT
TURNOUT
TURNOUT
TURNOUT
TURNOUT
TURNOUT
gravel pit
9
Exploration area
T30N
T29N
R29W
R19W
gravel pit
10
Exploration area
0
1 MILE

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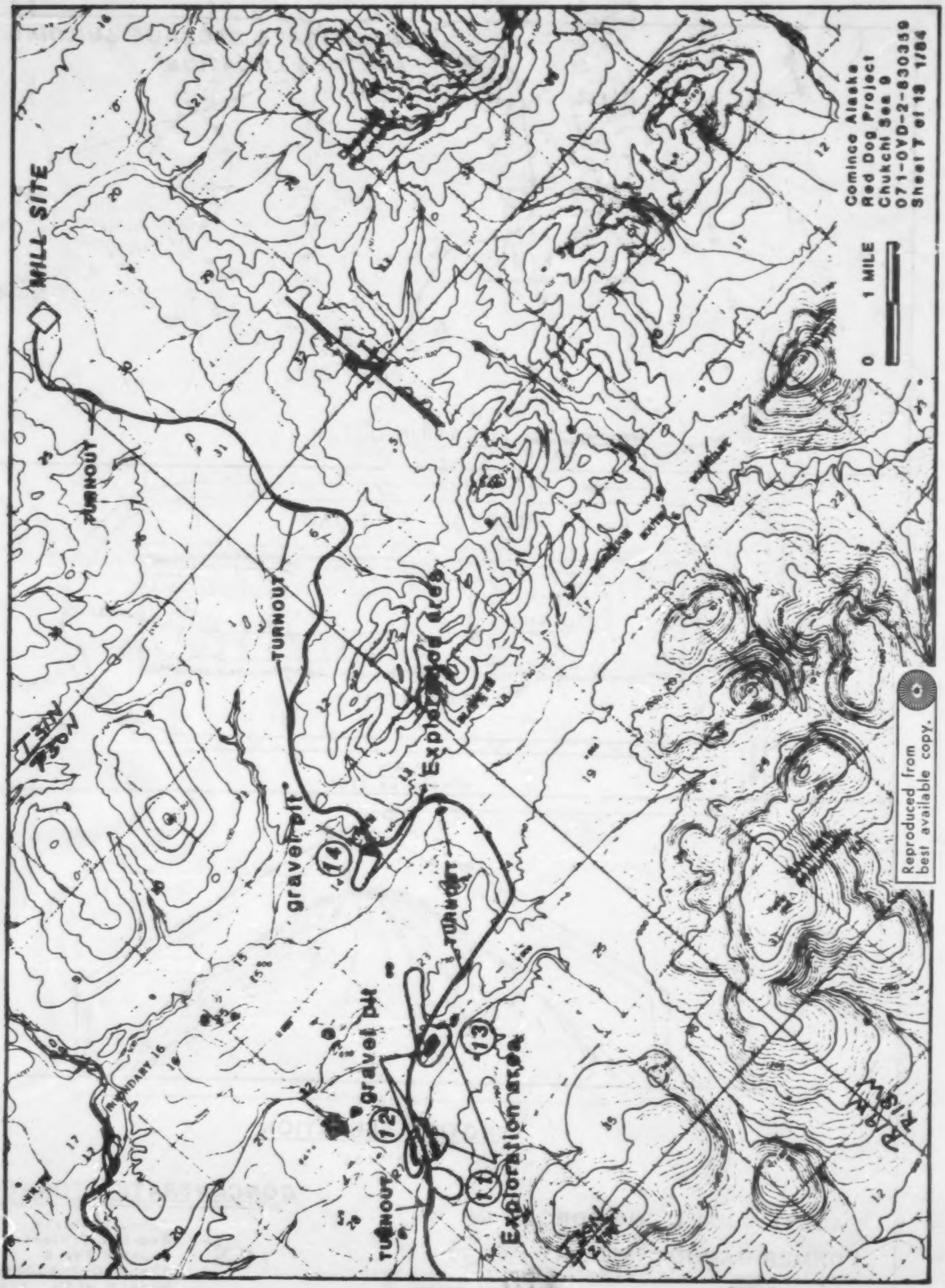
MATCH LINE D


MILL SITE
TURNOUT
TURNOUT
gravel pit
14
Exploration sites
TURNOUT
gravel pit
13
12
11
Exploration sites
TURNOUT
BOUNDARY 16
T30N
R15W
0 1 MILE
Cominco Alaska
Red Dog Project
Chukchi Sea 0
071-OYD-2-830350
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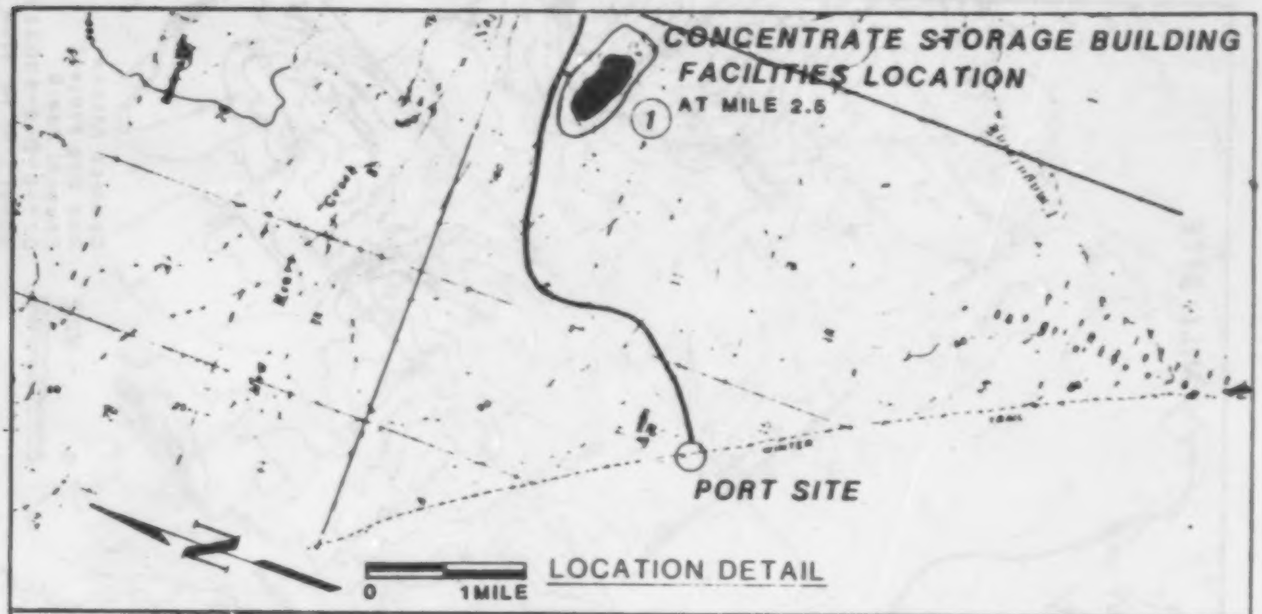
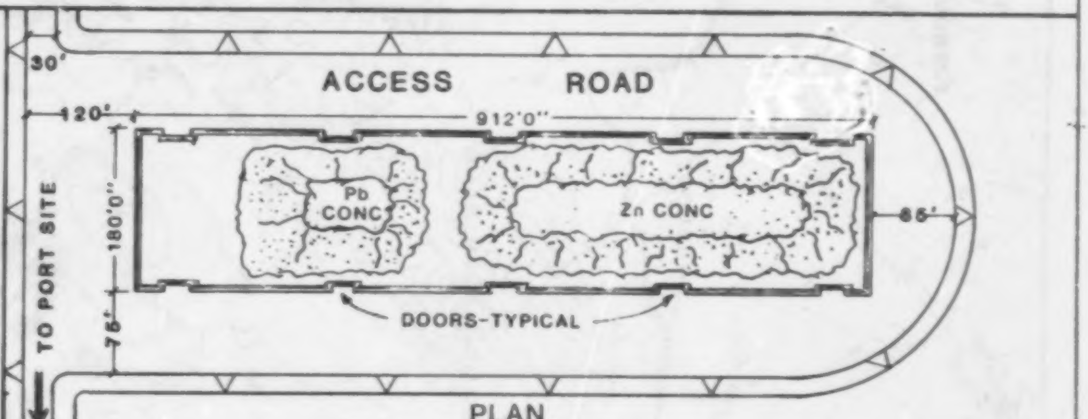
MATCH LINE D

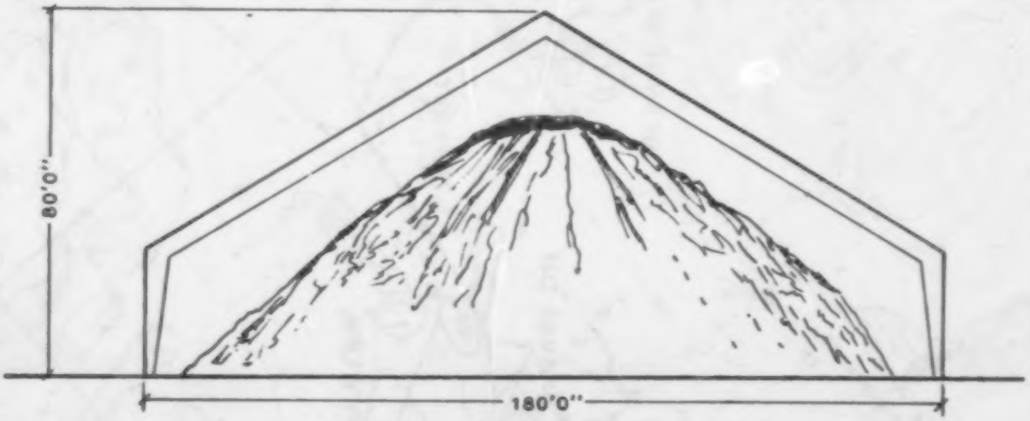

CONCENTRATE STORAGE BUILDING
FACILITIES LOCATION
①
AT MILE 2.5
PORT SITE
N
0
1MILE

LOCATION DETAIL


30'
ACCESS ROAD
120'
912'0"
180'0"
Pb CONC
Zn CONC
85'
TO PORT SITE
75'
DOORS-TYPICAL

PLAN

1" = approx.170'



SECTION ELEVATION

1" = 35'

CONCENTRATE STORAGE

FACILITY BUILT ON BEDROCK OF
FORMER BARROW SITE AT PT. ①

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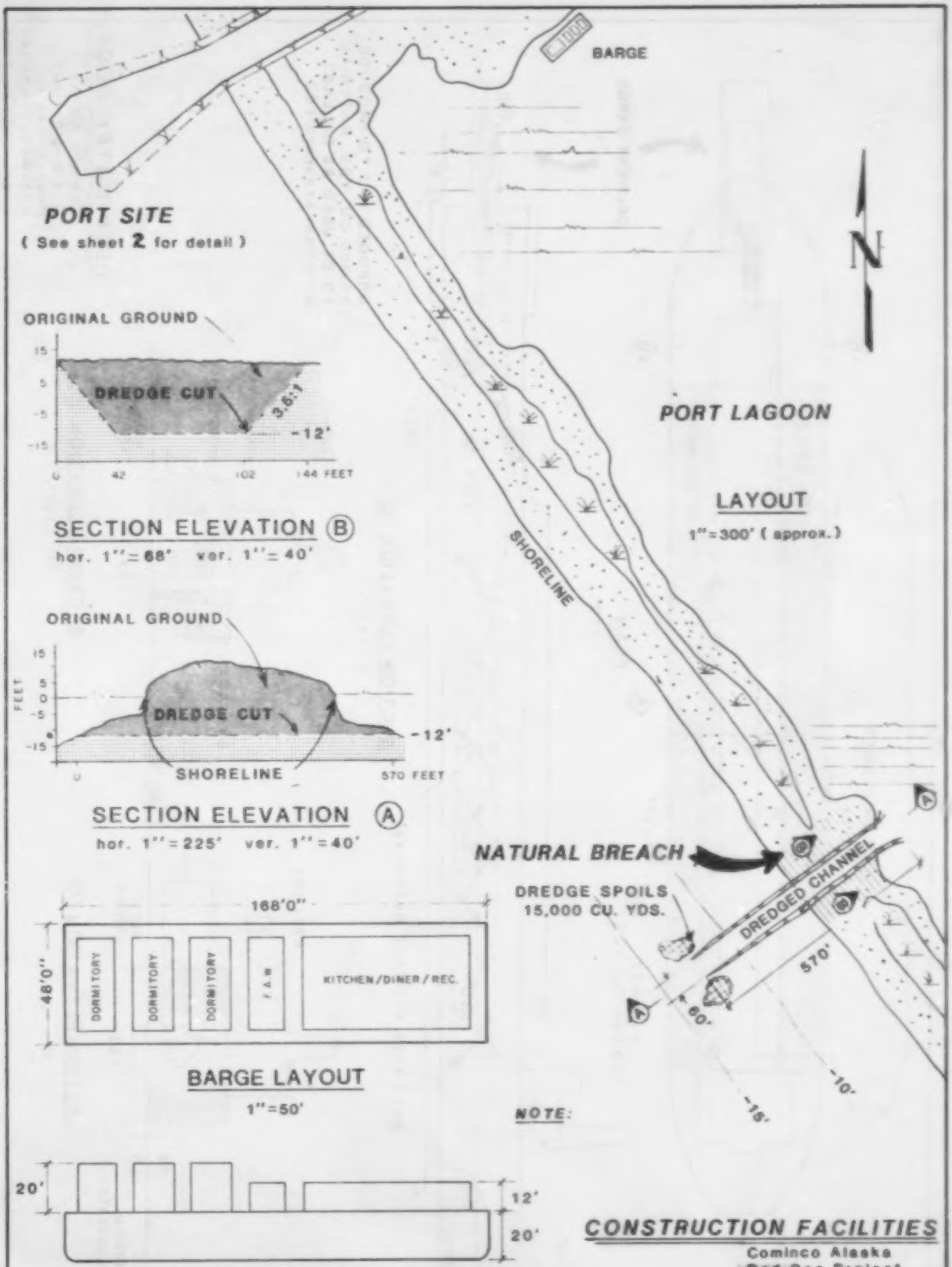
BARGE
1000
N
PORT SITE
(See sheet 2 for detail)
PORT LAGOON
SHORELINE
NATURAL BREACH
DREDGE SPOILS
15,000 CU. YDS.
DREDGED CHANNEL
570'
60'
-10'
-15'
A
B
ORIGINAL GROUND
15
5
-5
-15
DREDGE CUT
3.6:1
-12'
0
42
102
144 FEET
ORIGINAL GROUND
FEET
15
5
0
-5
-15
DREDGE CUT
-12'
SHORELINE
0
570 FEET
168'0"
48'0"
DORMITORY
DORMITORY
DORMITORY
F.A.W.
KITCHEN / DINER / REC.
20'
12'
20'

LAYOUT

1"=300' (approx.)

SECTION ELEVATION Ⓑ

hor. 1"=68' ver. 1"=40'

SECTION ELEVATION Ⓐ

hor. 1"=225' ver. 1"=40'

BARGE LAYOUT

1"=50'

ELEVATION

1"=50'

NOTE:

CONSTRUCTION FACILITIES

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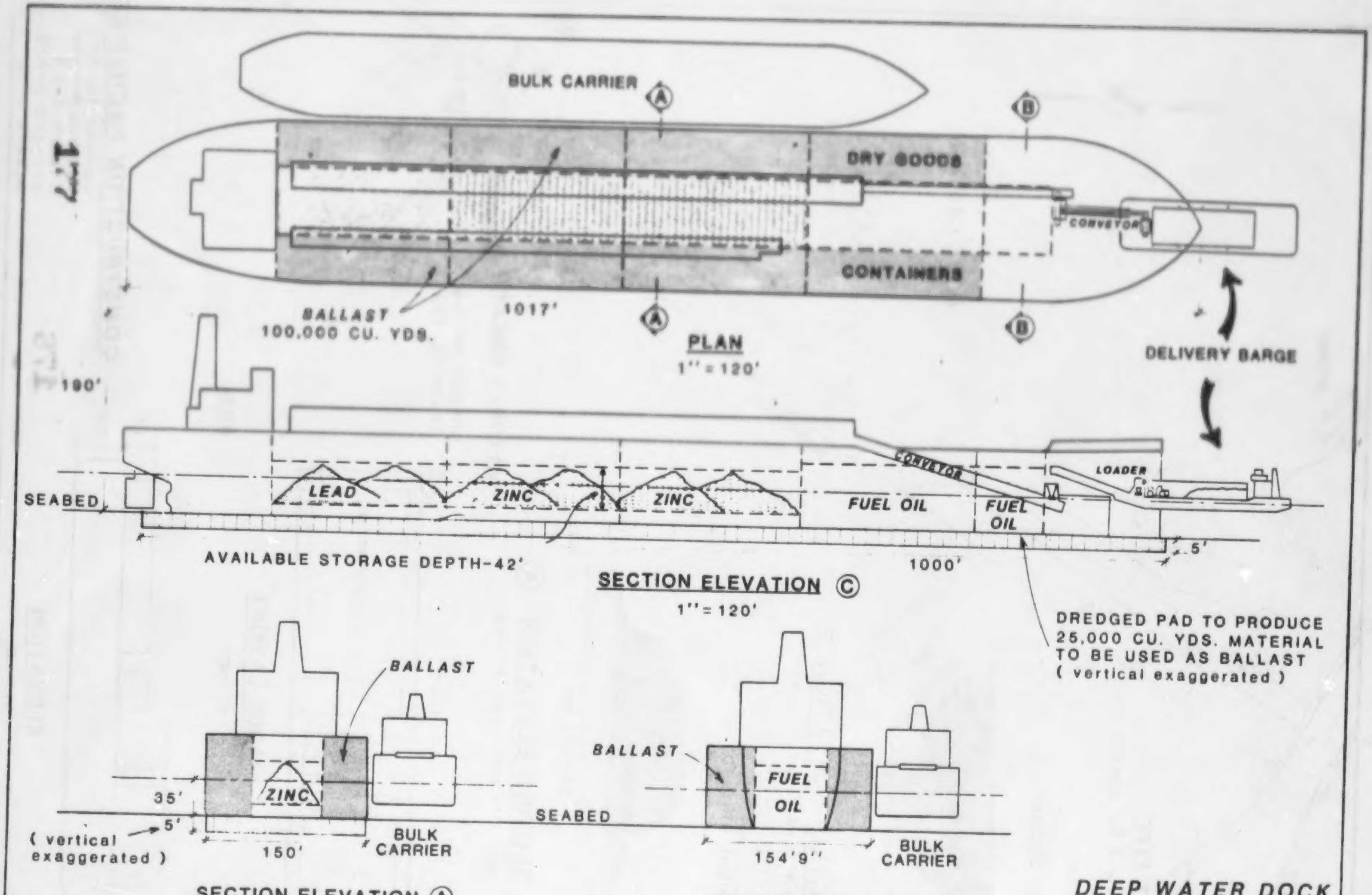
BULK CARRIER
A
B
DRY GOODS
CONTAINERS
CONVEYOR
BALLAST
100,000 CU. YDS.
1017'
DELIVERY BARGE
PLAN
1'' = 120'
190'
SEABED
LEAD
ZINC
ZINC
FUEL OIL
FUEL OIL
CONVEYOR
LOADER
5'
AVAILABLE STORAGE DEPTH-42'
1000'
SECTION ELEVATION C
1'' = 120'
DREDGED PAD TO PRODUCE
25,000 CU. YDS. MATERIAL
TO BE USED AS BALLAST
(vertical exaggerated)
BALLAST
ZINC
35'
5'
(vertical exaggerated)
150'
BULK CARRIER
SEABED
SECTION ELEVATION A
1'' = 120'
BALLAST
FUEL OIL
154'9''
BULK CARRIER
SECTION ELEVATION B
1'' = 120'

DEEP WATER DOCK

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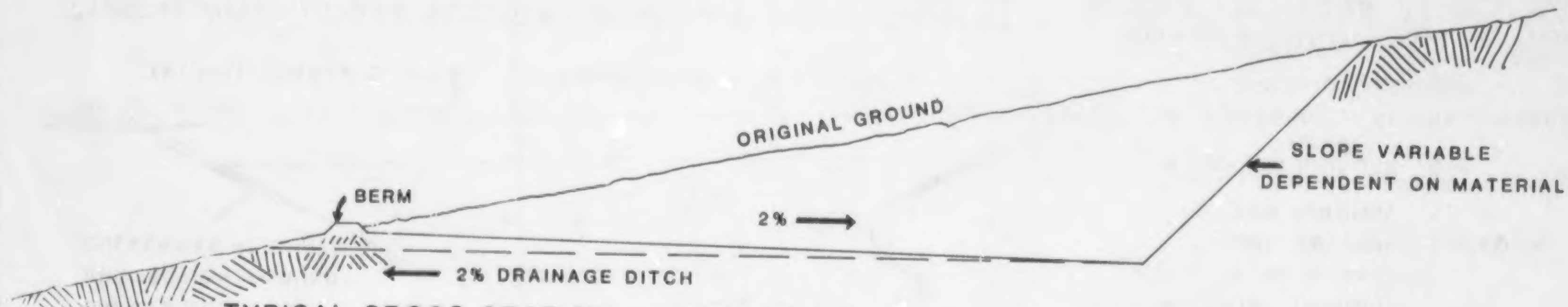
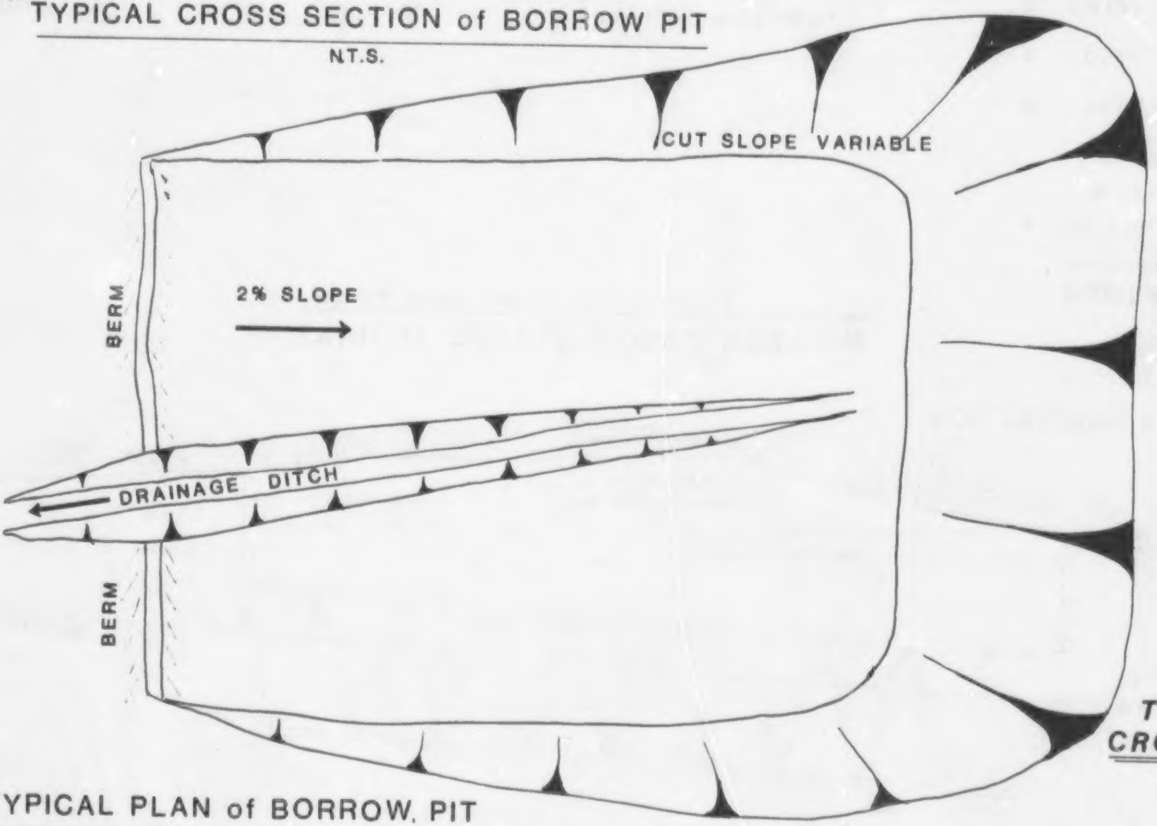

ORIGINAL GROUND
SLOPE VARIABLE
DEPENDENT ON MATERIAL
BERM
2% →
← 2% DRAINAGE DITCH

TYPICAL CROSS SECTION of BORROW PIT

N.T.S.


CUT SLOPE VARIABLE
2% SLOPE
BERM
DRAINAGE DITCH
BERM

TYPICAL PLAN of BORROW. PIT

N.T.S.

NOTE:

VOLUME OF OVERBURDEN NOT AVAILABLE

NO OVERBURDEN STOCKPILES SHOWN AT THIS TIME

TYPICAL BORROW PIT CROSS SECTION & PLAN

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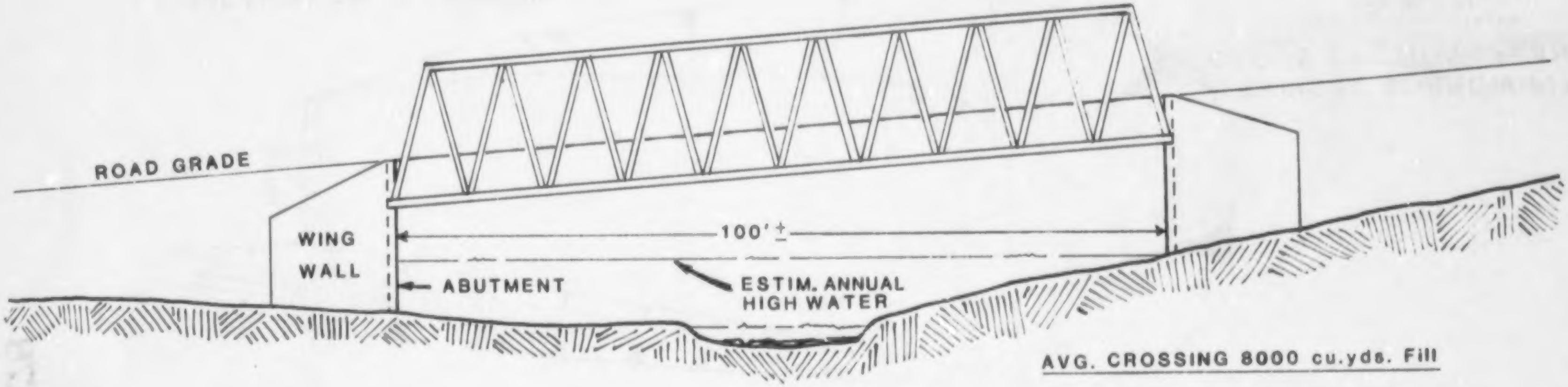
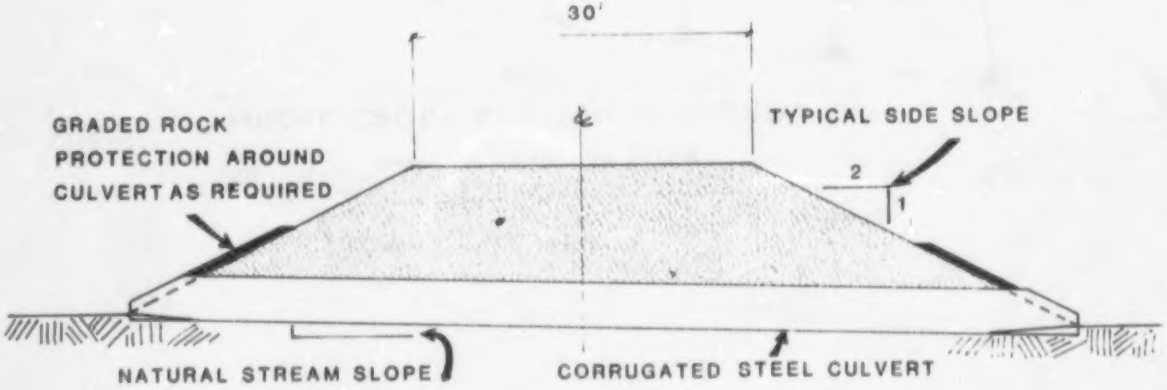

ROAD GRADE
WING WALL
ABUTMENT
100' ±
ESTIM. ANNUAL HIGH WATER

AVG. CROSSING 8000 cu.yds. Fill

TYPICAL BRIDGE CROSS SECTION

SCALE :HOR. 1"=20' VERT. 1"=10'


30'
℄
GRADED ROCK PROTECTION AROUND CULVERT AS REQUIRED
TYPICAL SIDE SLOPE
2
1
NATURAL STREAM SLOPE
CORRUGATED STEEL CULVERT

TYPICAL ROAD CROSS SECTION SHOWING TYPICAL CULVERT

0 15'

AVG. 1500 cu. yds. of fill

EXPLANATION of ROAD

- 56.7 MILES LONG, 30' NOMINAL WIDTH W/GRAVELED SURFACE & AVG. 6' SUBBASE of GRANULAR FILL
- TOTAL FILL : 3,866,000 cu. yds.
- TOTAL CULVERTS : 175
- TOTAL TURNOUTS : 28
  - 4000 cu. yds. FILL
  - DIM. 50' WIDE X 350' LONG PER TURNOUT
- MAJOR BRIDGES : ONE
- CROSSING of RIVERS & STREAMS :
  - OMIKVIOROK RIVER

BRIDGE&ROAD CROSS SECTIONS

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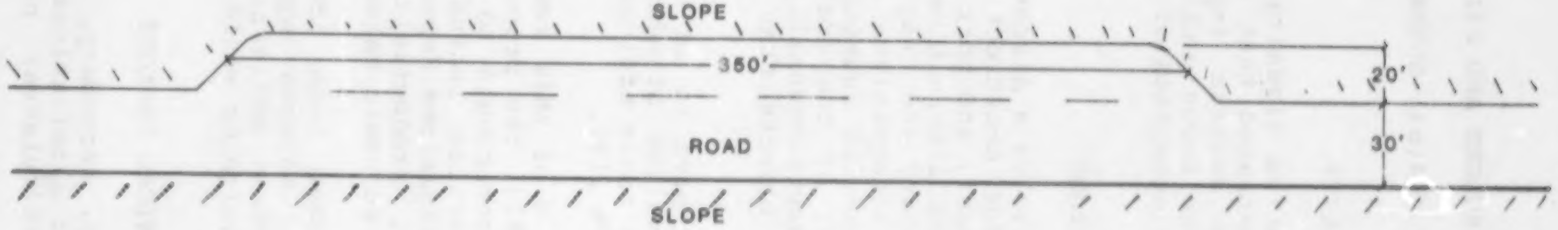
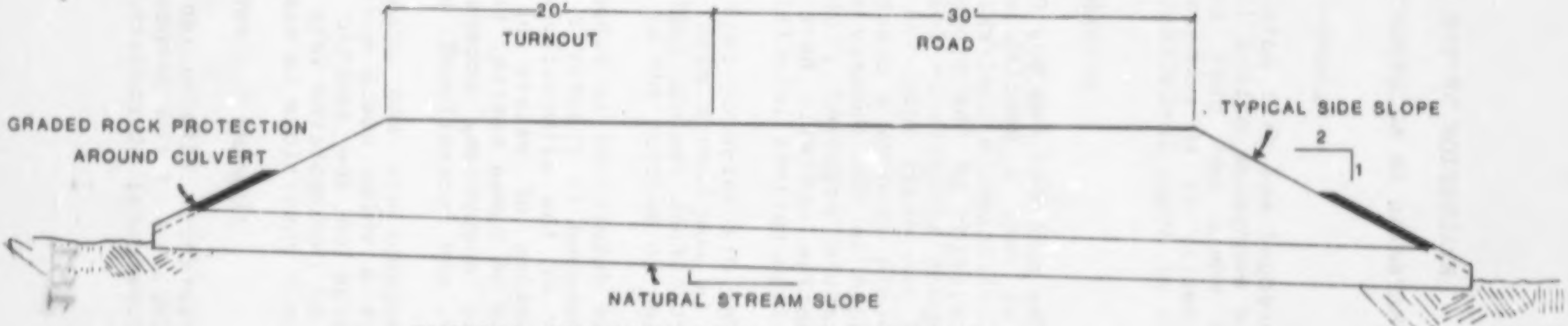

SLOPE
350'
20'
ROAD
30'
SLOPE

TYPICAL PLAN OF TURNOUT

SCALE 1" 60'

NOTE:

REFER TO SHEET 2 of 13


20'
TURNOUT
30'
ROAD
GRADED ROCK PROTECTION
AROUND CULVERT
TYPICAL SIDE SLOPE
2
1
NATURAL STREAM SLOPE

TYPICAL CROSS SECTION OF TURNOUT

N.T.S.

TYPICAL TURNOUT
CROSS SECTION & PLAN

Cominco Alaska
Red Dog Project
Chukchi Sea 9
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APPENDIX 5

EVALUATION OF THE DISCHARGE OF DREDGED AND FILL MATERIAL IN ACCORDANCE WITH SECTION 404(b)1 GUIDELINES

SUBPART A - ACCEPTABILITY

Dredged and fill material should not be discharged into the aquatic ecosystem unless it can be demonstrated that such a discharge would not have an unacceptable adverse impact either individually or in combination with other known and/or probable impacts of other activities affecting the ecosystem of concern.

SUBPART B - RESTRICTIONS

The proposed Red Dog Project woud involve a discharge of fill material into a special aquatic site for construction of mine site facilities, a road/railbed to the coast, and port facilities. A description of the proposed project and alternatives evaluated for impact analysis is found in the Summary and Chapters II and III of the draft EIS. All practicable alternatives to the project would involve a discharge into a special aquatic site. As discussed in the Summary and Chapter III of the draft EIS, the applicant's proposed project is the environmentally preferred alternative and will have less adverse impacts than any of the other alternatives identified.

The discharge of fill material will have to be certified as being in compliance with State Water Quality Standards and the project cannot violate applicable Federal toxic effluent standards pursuant to Section 307 of the CWA (40 CFR 219).

As determined in Subparts C through G of this evaluation and as discussed in Chapter V of the draft EIS, the proposed project or any of the alternatives, would not contribute to significant degradation of waters of the United States including adverse effects on human health, life stages of organisms dependent on the aquatic ecosystem, ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values.

Appropriate and practical steps have been identified in Subpart H which would minimize potential adverse impacts of the discharge on the aquatic ecosystem. These mitigating measures would be incorporated into the project design or would be required by permit conditions or other agreements.

SUBPART C - PHYSICAL AND CHEMICAL IMPACTS

Pertinent information about primary, secondary, and cumulative impacts of the proposed project and alternatives related to the substrate; turbidity/suspended particulates; physical and chemical changes to the water column; current, circulation, or fluctuation; and salinity gradients is contained in Chapter V of the draft EIS.

SUBPART D - BIOLOGICAL IMPACTS

Pertinent information about primary, secondary, and cumulative impacts of the proposed project and alternatives related to threatened and endangered species, aquatic organisms, and wildlife is contained in Chapter V of the draft EIS.

SUBPART E - POTENTIAL IMPACTS ON SPECIAL AQUATIC SITES

Special aquatic sites that would be affected by the proposed project are wetlands, mud flats, and vegetated shallows. Depending on the exact alignment of the road/railbed, riffle and pool complexes may also be affected. Discussions about impacts of the proposed project and alternatives on values associated with those special aquatic sites are found in Chapter V of the draft EIS.

SUBPART F - IMPACTS ON HUMAN USE CHARACTERISTICS

Human use characteristics that would be affected by the proposed project include subsistence species, recreational and commercial fisheries, water-related recreation activities, aesthetics, Cape Krusenstern National Monument, and archeological sites. As discussed in the draft EIS, the proposed project will have a low level of impact on each of these characteristics. Pertinent information about potential impacts of the proposed project and alternatives is found in the Summary and Chapters III and V of the draft EIS.

SUBPART G - EVALUATION AND TEST

The source and type of discharge material that would be used to develop the proposed project or any of the alternatives is described in chapter II of the draft EIS. Based on these evaluations and discussions, and the locations of the potential gravel sites described, the possibility that the proposed discharge material is a carrier of contaminants is very unlikely. Based on this evaluation, there is little likelihood that discharges associated with the proposed project would result in contamination of the aquatic ecosystem; therefore, no testing would be required.

SUBPART H - ACTION TO MINIMIZE ADVERSE EFFECT

Those practicable actions which are not part of the applicant's current proposal but which could be taken to minimize significant adverse effects of the proposed discharge are described in Chapter V of the draft EIS.

Appendix 6

ANILCA Title XI Right-of-Way Application

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STANDARD FORM 299(3-83)
Prescribed by DOI/USDA/DOT
P.L. 96-487 and Federal
Register Notice 6-3-81

APPLICATION FOR TRANSPORTATION AND UTILITY SYSTEMS AND FACILITIES ON FEDERAL LANDS

FORM APPROVED
OMB NO. 1004-0060

NOTE: Before completing and filing the application, the applicant should completely review this package and schedule a preapplication meeting with representatives of the agency responsible for processing the application. Each agency may have specific and unique requirements to be met in preparing and processing the application. Many times, with the help of the agency representative, the application can be completed at the preapplication meeting.

FOR AGENCY USE ONLY
Application Number
Date filed Nov 7, 1983
revised DEC 14, 1983

1. Name and address of applicant *(include zip code)*
COMINCO ALASKA
DIVISION OF COMINCO AMERICAN INC.
5660 B St., Anchorage, AK 99502

2. Name, title, and address of authorized agent if different from Item 1 *(include zip code)*
H. M. GIEGERICH, PRESIDENT
COMINCO ALASKA
5660 B St., Anchorage, AK 99502

3. TELEPHONE *(area code)*
Applicant 907/563-3686
Authorized Agent Same

4. As applicant are you? *(check one)*
- a. ☐ Individual
- b. ☒ Corporation*
- c. ☐ Partnership/Association*
- d. ☐ State Government/State Agency
- e. ☐ Local Government
- f. ☐ Federal Agency

** If checked, complete supplemental page*

5. Specify what application is for: *(check one)*
- a. ☐ New authorization
- b. ☐ Renew existing authorization No. ________
- c. ☐ Amend existing authorization No. ________
- d. ☐ Assign existing authorization No. ________
- e. ☐ Existing use for which no authorization has been received*
- f. ☒ Other* Supply additional information

** If checked, provide details under item 7*

6. If an individual, or partnership are you a citizen(s) of the United States? ☒ Yes ☐ No

7. Project description *(describe in detail)*: (a) Type of system or facility, *(e.g., canal, pipeline, road)*; (b) related structures and facilities; (c) physical specifications *(length, width, grading, etc.)*; (d) term of years needed; (e) time of year of use or operation; (f) Volume or amount of product to be transported; (g) duration and timing of construction; and (h) temporary work areas needed for construction. *(Attach additional sheets, if additional space is needed.)*

SEE ATTACHMENT "A"

8. Attach map covering area and show location of project proposal SEE ATTACHMENT "B"

9. State or local government approval: ☐ Attached ☐ Applied for ☒ Not required See Attachment "A"

0. Nonreturnable application fee: ☐ Attached ☐ Not required

1. Does project cross international boundary or affect international waterways? ☐ Yes ☒ No *(If "yes," indicate on map)*

2. Give statement of your technical and financial capability to construct, operate, maintain, and terminate system for which authorizatic is being requested.

SEE ATTACHMENT "A"

13a. Describe other reasonable alternative routes and modes considered.

SEE ATTACHMENT "A"

b. Why were these alternatives not selected?

SEE ATTACHMENT "A"

c. Give explanation as to why it is necessary to cross Federal lands.

The proposed route represents the alternative which would have the least environmental impact of the routes considered. Further, the route through the Monument represents the best engineering alternative for construction of access in this region. Please refer to the preliminary draft EIS for a complete review of this subject.

14. List authorizations and pending applications filed for similar projects which may provide information to the authorizing agency. *(Sp ify number, date, code, or name.)*

SEE ATTACHMENT "A"

15. Provide statement of need for project, including the economic feasibility and items such as: (a) cost of proposal *(construction, op ation, and maintenance)*; (b) estimated cost of next best alternative; and (c) expected public benefits.

SEE ATTACHMENT "A"

16. Describe probable effects on the population in the area, including the social and economic aspects, and the rural lifestyles.

SEE ATTACHMENT "A"

17. Describe likely environmental effects that the proposed project will have on: (a) air quality; (b) visual impact; (c) surface and grou water quality and quantity; (d) the control or structural change on any stream or other body of water; (e) existing noise levels; a (f) the surface of the land, including vegetation, permafrost, soil, and soil stability.

SEE ATTACHMENT "A"

18. Describe the probable effects that the proposed project will have on: (a) populations of fish, plant, wildlife, and marine life, includi threatened and endangered species; and (b) marine mammals, including hunting, capturing, collecting, or killing these animals.

SEE ATTACHMENT "A"

19. Name all the Department(s)/Agency(ies) where this application is being filed.

NATIONAL PARK SERVICE
U.S. CORPS OF ENGINEERS
ENVIRONMENTAL PROTECTION AGENCY

I HEREBY CERTIFY, That I am of legal age and authorized to do business in the State and that I have personally examined the informatio contained in the application and believe that the information submitted is correct to the best of my knowledge.

Signature of Applicant	Date Dec 14/83

Title 18, U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the Unite States any false, fictitious, or fraudulent statements or representations as to any matter within its jurisdiction.

APPLICATION FOR TRANSPORTATION AND UTILITY SYSTEMS AND FACILITIES ON FEDERAL LANDS

By *(Signature)* ______________

GENERAL INFORMATION
ALASKA NATIONAL INTEREST LANDS

his application will be used when applying for a right-of-way, ermit, license, lease, or certificate for the use of Federal lands hich lie within conservation system units and National Recreation r Conservation Areas as defined in the Alaska National Interest ands Conservation Act. Conservation system units include the ational Park System, National Wildlife Refuge System, National ild and Scenic Rivers System, National Trails System, National ilderness Preservation System, and National Forest Monuments.

ransportation and utility systems and facility uses for which the pplication may be used are:

1. Canals, ditches, flumes, laterals, pipes, pipelines, tunnels, nd other systems for the transportation of water.

2. Pipelines and other systems for the transportation of liquids ther than water, including oil, natural gas, synthetic liquid and aseous fuels, and any refined product produced therefrom.

3. Pipelines, slurry and emulsion systems, and conveyor belts or transportation of solid materials.

4. Systems for the transmission and distribution of electric nergy.

5. Systems for transmission or reception of radio, television, elephone, telegraph, and other electronic signals, and other means f communications.

6. Improved rights-of-way for snow machines, air cushion ehicles, and all-terrain vehicles.

7. Roads, highways, railroads, tunnels, tramways, airports, anding strips, docks, and other systems of general transportation.

his application *must* be filed simultaneously with each Federal epartment or agency requiring authorization to establish and perate your proposal.

n Alaska, the following agencies will help the applicant file an pplication and identify the other agencies the applicant should ontact and possibly file with:

Department of Agriculture
Regional Forester, Forest Service (USFS)
Federal Office Building, P.O. Box 1628
Juneau, Alaska 99802
Telephone: (907) 588–7247 *(or a local Forest Service Office)*

Department of Interior
Bureau of Indian Affairs (BIA)
Juneau Area Office, P.O. Box 3–8000
Juneau, Alaska 99802
Telephone: (907) 586–7209

Bureau of Land Management (BLM)
701 C Street, Box 13
Anchorage, Alaska 99513
Telephone: (907) 271–5055 *(or a local BLM Office)*

National Park Service (NPS)
Alaska Regional Office, 540 West 5th Avenue, Room 202
Anchorage, Alaska 99501
Telephone: (907) 271–4196

U.S. Fish & Wildlife Service (FWS)
Office of the Regional Director
1011 East Tudor Road
Anchorage, Alaska 99503
Telephone: (907) 276–3800

ote-Filings with any Interior agency may be filed with any office oted above or with the: Office of the Secretary of the Interior, egional Environmental Officer, Box 120, 1675 C Street, Anchor-ge, Alaska 99513.

Department of Transportation
Federal Aviation Administration
Alaska Region-AAL–4, P.O. 14
Anchorage, Alaska 99513

NOTE - The Department of Transportation has established the above central filing point for agencies within that Department. Affected agencies are: Federal Aviation Administration (FAA), Coast Guard (USCG), Federal Highway Administration (FHWA), Federal Railroad Administration (FRA).

OTHER THAN ALASKA NATIONAL INTEREST LANDS

Use of this form is not limited to National Interest Conservation lands of Alaska.

Individual departments/agencies may authorize the use of this form by applicants for transportation and utility systems and facilities on other Federal lands outside those areas described above.

For proposals located outside of Alaska, applications will be filed at the local agency office or at a location specified by the responsible Federal agency.

SPECIFIC INSTRUCTIONS
(Items not listed are self-explanatory)

Item

7 Attach preliminary site and facility construction plans. The responsible agency will provide instructions whenever specific plans are required.

8 Generally, the map *must* show the section(s), township(s), and range(s) within which the project is to be located. Show the proposed location of the project on the map as accurately as possible. Some agencies require detailed survey maps. The responsible agency will provide additional instructions.

9, 10, and 12 – The responsible agency will provide additional instructions.

13 Providing information on alternate routes and modes in as much detail as possible, discussing why certain routes or modes were rejected and why it is necessary to cross Federal lands will assist the agency(ies) in processing your application and reaching a final decision. Include only reasonable alternate routes and modes as related to current technology and economics.

14 The responsible agency will provide instructions.

15 Generally, a simple statement of the purpose of the proposal will be sufficient. However, major proposals located in critical or sensitive areas may require a full analysis with additional specific information. The responsible agency will provide additional instructions.

16 through 18 – Providing this information in as much detail as possible will assist the Federal agency(ies) in processing the application and reaching a decision. When completing these items, you should use sound judgment in furnishing relevant information. For example, if the project is not near a stream or other body of water, *do not* address this subject. The responsible agency will provide additional instructions.

Application *must* be signed by the applicant or applicant's authorized representative.

If additional space is needed to complete any item, please put the information on a separate sheet of paper and identify it as "Continuation of Item".

supplemental, see reverse)

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best available copy.

SUPPLEMENTAL

NOTE: The responsible agency(ies) will provide additional instructions.	CHECK APPROPRIATE BLOCK	
I – PRIVATE CORPORATIONS	ATTACHED	FILED*
a. Articles of Incorporation	☐	☒
b. Corporation Bylaws	☐	☒
c. A certification from the State showing the corporation is in good standing and is entitled to operate within the State.	☐	☒
d. Copy of resolution authorizing filing	☐	☐
e. The name and address of each shareholder owning 3 percent or more of the shares, together with the number and percentage of any class of voting shares of the entity which such shareholder is authorized to vote and the name and address of each affiliate of the entity together with, in the case of an affiliate controlled by the entity, the number of shares and the percentage of any class of voting stock of that affiliate owned, directly or indirectly, by that entity, and in the case of an affiliate which controls that entity, the number of shares and the percentage of any class of voting stock of that entity owned, directly or indirectly, by the affiliate.	☐	☐
f. If application is for an oil or gas pipeline, describe any related right-of-way or temporary use permit applications, and identify previous applications.	☐	☐
g. If application is for an oil and gas pipeline, identify all Federal lands by agency impacted by proposal.	☐	☐
II – PUBLIC CORPORATIONS		
a. Copy of law forming corporation	☐	☐
b. Proof of organization	☐	☐
c. Copy of Bylaws	☐	☐
d. Copy of resolution authorizing filing	☐	☐
e. If application is for an oil or gas pipeline, provide information required by Item "I-f" and "I-g" above.	☐	☐
III – PARTNERSHIP OR OTHER UNINCORPORATED ENTITY		
a. Articles of association, if any	☐	☐
b. If one partner is authorized to sign, resolution authorizing action is	☐	☐
c. Name and address of each participant, partner, association, or other	☐	☐
d. If application is for an oil or gas pipeline, provide information required by Item "I-f" and "I-g" above.	☐	☐

* If the required information is already filed with the agency processing this application and is current, check block entitled "Filed." Provide the file identification information *(e.g., number, date, code, name)*. If not on file or current, attach the requested information.

NOTICE

The Privacy Act of 1974 provides that you be furnished the following information in connection with information required by this application for an authorization.

AUTHORITY: 16 U.S.C. 310; 5 U.S.C. 301.

PRINCIPLE PURPOSE: The information is to be used to process the application.

ROUTINE USES: (1) The processing of the applicant's request for an authorization. (2) Documentation for public information. (3) Transfer to appropriate Federal agencies when concurrence is required prior to granting a right in public lands or resources. (4)(5) Information from the record and/or the record will be transferred to appropriate Federal, State, local or foreign agencies, when relevant to civil, criminal or regulatory investigations or prosecutions.

EFFECT OF NOT PROVIDING INFORMATION: Disclosure of the information is voluntary. If all the information is not provided, the application may be rejected.

DATA COLLECTION STATEMENT

The Federal agencies collect this information from applicants requesting right-of-way, permit, license, lease, or certification for the use of Federal lands.

The Federal agencies use this information to evaluate the applicant's proposal.

The public is obligated to respond to this information request if they wish to obtain permission to use Federal lands.

ATTACHMENT A

INTRODUCTION

Due to the scope of the questions asked in the Title 11 application, presented below are responses to questions 7, 9, 12, and 13 to 18 as outlined in Standard Form 299.

QUESTION 7:

The Project Description

The proposed project would consist of constructing a road and associated facilities through the northwest corner of Cape Krusenstern National Monument. The road would be single lane, 30 feet wide with slightly larger section of the road (50 feet wide) developed to serve as turnouts. The road fill would average approximately 6 feet in depth with an average grade of 1 to 3 percent. The associated facilities will entail borrow sites used to obtain fill material for the road and a concentrate storage building located 2.5 miles from the coast.

There would be approximately 6 potential borrow sites within Cape Krusenstern National Monument. Table 1 gives the details of the borrow sites.

The specific barrow site locations are listed in Appendix C.

The concentrate storage building would hold the lead and zinc concentrate at the coast before shipment. The building would be 912 feet by 180 feet by 80 feet high. The building would be located on a excavated barrow pit to reduce the need to disturb additional ground. Please refer to Appendix C for additional information.

The purpose of the road is to provide access to the Red Dog Mine. The development of the associated barrow permits is essential to the cost effective construction of the roadway. Transporting borrow from outside the Monument would substantially increase the cost of the southern corridor. The increase in cost, although cumulatively not greater than the cost of constructing the northern alternative, would make the southern corridor prohibitive to build.

The purpose of the concentrate storage building is to hold concentrate for later shipment. The proposed location offers the best option for placement due to access to the road, foundation conditions, and limiting the amount of disturbed land within the Monument (due to the placement of the building on an existing borrow site).

The total right-of-way requested is 250 feet from the centerline of the road. The centerline will be set after additional engineering design is complete.

Table I

PRELIMINARY BORROW SITE SPECIFICATIONS,
SOUTHERN CORRIDOR

Borrow Site Number	Exploration Area		Disturbed Pit Area		Approximate Volume Needed		Average Excavation Depth		Access Road Length		Within 91 m (100 yd) of Stream
	ha	ac	ha	ac	m^3	yd^3	m	ft	km	mi	
1*	85.5	211.2	19.4	48.0	305,853	400,043	2.1	7.0	0.19	0.12	No
2	49.2	121.6	9.5	23.4	289,144	378,188	3.0	10.0	0.39	0.24	No
3	57.0	140.8	--	--	--	--	--	--	--	--	No
4	98.4	243.2	5.2	12.8	190,189	248,760	4.9	16.0	1.29	0.80	No
5	77.7	192.0	13.9	34.4	590,100	771,826	4.3	14.0	1.08	0.67	No
6	163.2	403.2	--	--	--	--	--	--	--	--	Yes

* Will also serve as the coastal concentrate storage facility site after borrow excavation.

The road would serve as access to the Red Dog Mine for the expected project life which is presently estimated at 50 years. Use of the road would be year-round with the possible exceptions of a period during spring breakup and during significant caribou migration periods.

Construction is scheduled to begin in July of 1985. Road construction will require approximately 16 months with a majority of initial construction in the Monument to be completed between January through April of 1986.

The movement of the mine's output of lead and zinc concentrate will require a total between 9 to 12 trips per day when the mine is operating.

Please refer to Appendix C for specific details of turnout location, siting of the road corridor, specifics on the concentrate storage building and detail on the borrow pits.

QUESTION 9:

State or Local Approvals

There are no specific state or local approvals which must be obtained as part of the formal Title XI process. However, there are two State of Alaska certificates which must be obtained by the Corps of Engineers and one by EPA for the federal process to move forward. The Corps of Engineers (COE) must obtain a 401 Consistency Determination of the 404 Wetlands permit. Further, the COE must obtain from the state a Coastal Zone Management Consistency Determination to complete the Section 10/404 process. Cominco has made application for the Coastal Zone Management Consistency Determination. In addition the National Park Service must obtain approval from the State Historic Preservation Officer as to how cultural resources will be maintained.

EPA must obtain a 401 Water Quality Consistency Determination from the Alaska Department of Environmental Conservation to complete the NPDES process. Cominco is not aware of any specific action which the company needs to take on the 401 state certifications.

Question 14 outlined all permits which need to be obtained for the total Red Dog project.

QUESTION 12:

Review of Technical and Financial Ability to Construct Such a Route

Cominco Alaska is a division of Cominco American, Incorporated which in turn is wholly-owned by Cominco Ltd. Cominco Ltd. is a public company and currently has outstanding approximately 5.8 million preferred shares and 18.8 million common shares of stock. Sales of products and services for the worldwide Cominco operation during 1982 amounted to $1.24 billion, and its assets were $2.09 billion at December 31, 1982. Cominco Ltd. in turn is 51 percent owned by Canadian Pacific Enterprises Ltd., a wholly owned subsidiary of Canadian Pacific Railway.

Cominco Ltd. has been in the mining business for more than 75 years. The mining and integrated metals segment of its business comprises mining, processing, smelting and refining of lead, zinc, copper, silver and gold. Cominco Ltd. and its subsidiaries have substantial experience in mining under Arctic conditions. Most recently, its new Polaris Mine on Little Cornwallis Island in the Canadian High Arctic became the most northerly mine in the world.

Cominco American, Incorporated has been engaged in the conduct of a trade or business within the United States since June 6, 1929 and is currently qualified to do business in 30 states. It is a substantial operating company that has mining operations in Bixby, Missouri; Garrison, Montana; and Lone Pine, California. It also has substantial chemical fertilizer operations in Beatrice, Nebraska and Borgey, Texas and an electronic materials operation located in Spokane, Washington.

QUESTION 13:

Identify Alternatives to the Proposed Project

A. A total of three options and five suboptions were considered for the transportation route. In addition, four options and two suboptions were considered for the mode or system of transport. See the following table for a complete listing of routes and modes initially considered.

TRANSPORTATION OPTIONS & SUBOPTIONS

INITIALLY CONSIDERED

Transportation	Option	Suboption
° Route	Northern	GCO Route
	Southern	Western Route
		Omikviorok Route
		Kruz Route
	Noatak	
° Mode	Slurry Pipeline	
	Hovercraft	
	Railroad	
	Road	Winter only
		"Year-Round"

Transportation Route:

Characteristics important in selecting a route include distance, ability to maintain grades suitable for both a railroad and road, suitability of soil conditions, avoidance to the extent possible of major stream crossings, subsistence use areas and archeological sites, impact on Cape Krusenstern National Monument, and impacts on other regional uses. See the following table for the total distance traversed by each route considered.

DISTANCES FOR TRANSPORTATION CORRIDOR OPTIONS AND SUBOPTIONS

Transportation Corridor		Total Distance	
Option	Suboption	Mine to Port Site (Miles)	Within Monument (Miles)
Northern	GCO	83.5	
	Asikpak	73.1	
Southern	Western (VABM 17)	59.9	9.8
	Western (VABM 28)	65.5	17.0
	Omikviorok (VABM 17)	55.4	21.6
	Omikviorok (VABM 28)	61.0	28.8
	KRUZ (VABM 28)	56.2	24.0
Noatak	To Noatak Village	51.0	
	To Fish Hatchery	69.0	

Northern Corridor:

The northern corridor has two suboptions. The first would be the GCO route originally suggested by General Crude Oil (GCO) Minerals. This route would connect GCO's Lik mineral prospect 19 km (12 mi) northwest of Red Dog Valley to the Chukchi Sea port site at Singoalik Lagoon, 42 km (27 mi) northwest of Kivalina. The route, as modified to reach the Red Dog Valley, would traverse the Wulik and Kivalina Rivers and then cross into and down the Singoalik River drainage to the coast. It would be 133.6 km (83.5 mi) long and have eight major multi-span bridge crossings (greater than 30.5 m [100 ft]).

The second northern corridor suboption would be the Asikpak route. This route would share a common alignment with the GCO route for the first 46.6 km (29.1 mi) from Red Dog Valley. From the point of divergence at the west fork of the Wulik River, the Asikpak route would proceed westerly similar to the GCO route, but south of it, reaching the coast via the Asikpak River at Tugak Lagoon, 24 km (15 mi) northwest of Kivalina. The route would be 120 km (75 mi) long and have six major multi-span bridge crossings.

Southern Corridor:

The southern corridor would share a common alignment with the northern corridor for the first 11.8 km (7.4 mi). At that point the southern corridor continues southwest along the flanks of the Mulgrave Hills.

The southern corridor has three suboptions, all following the same alignment for approximately the first 48.3 km (30.2 mi) south from Red Dog Valley. At that point, just north of the northern boundary of Cape Krusenstern National Monument, the western route suboption would diverge west to within approximately 3.2 km (2 mi) of the Wulik River. It would then turn south into Native-selected, but not yet conveyed, lands still within the Monument, paralleling the Omikviorok River to the VABM 17 port site, or crossing the river and proceeding south to the VABM 28 port site. The leg to VABM 17 would cross no major streams. The leg to VABM 28 would have one major multi-span bridge crossing. Termination of the southern corridor at VABM 17 versus VABM 28 would be determined by selection of the port site based on relative environmental consequences.

The Omikviorok route suboption would also diverge west from the common alignment. Beginning just south of the northern boundary of the Monument, the route would parallel the Omikviorok River to VABM 17, or cross the Omikviorok River and proceed south to VABM 28. The leg to VABM 17 would cross no major streams. The leg to VABM 28 would have one major multi-span bridge crossing.

The Krusenstern route suboption would continue to VABM 28 from the points of divergence from the other suboptions. It would cross the Omikviorok River considerably further upstream than the other two suboptions.

Noatak Corridor:

The Noatak corridor option would proceed south from Red Dog Valley on the same alignment as the southern corridor for approximately 20.8 km (13 mi) and then southeast down Eviangiknuk Creek into the Noatak Valley. It would then proceed south on the west side of the Noatak River, paralleling the river at least as far as the Village of Noatak 81.6 km (51 mi). It would probably continue on to the vicinity of the fish hatchery approximately 28.8 km (18 mi) downriver from Noatak (total corridor length of 110.4 km [69 mi]) to reach deeper water for barge transport.

Transportation Mode

Four options were identified (slurry pipeline, hovercraft, railroad and road). The road had two suboptions: a winter only road and a year-round road. Characteristics important in selecting a transportation system include availability of technology and reliability.

Screening Process

To determine the best options, a two-step options screening process was conducted. In the first step all options were reviewed to eliminate from further consideration those which were clearly unreasonable or infeasible primarily for environmental or technical reasons. The table below lists those options eliminated during the initial review process.

TRANSPORTATION OPTIONS & SUBOPTIONS ELIMINATED DURING INITIAL REVIEW PROCESS

Transportation	Option	Suboption
° Route	Noatak	
° Mode	Slurry Pipeline	
	Hovercraft	
	Road	Winter

(See table "Major Reasons for Elimination of Transportation Options and Suboptions During Initial Review Process".)

In the second step, the remaining, options were individually evaluated in detail from the perspective of each resource or technical discipline (e.g., water quality, wildlife, subsistence, technical feasibility). For each discipline, a specific set of "options screening criteria" was used to identify potential impacts for each option. Then, each options was compared to all other related options to identify the best option (i.e., the one with the least potential impacts) for both the transportation route and mode.

COMPARISON TABLE

	Component Option Suboption	Relative Level of Potential Impact[1] Low	 Moderate	 High	
	Transportation Route[2]				
	Northern Corridor				
COMPARED	GCO Route		Subsistence Regional Use	Water Quality Vegetation Freshwater Biology Fish Wildlife Cultural Resources Technical Feasibility Economic Feasibility	ELIMINATED
	Asikpak Route	Cultural Resources Regional Use	Water Quality Vegetation Freshwater Biology Fish Wildlife Technical Feasibility	Subsistence Economic Feasibility	
	Southern Corridor				
COMPARED	Western Route	Krusenstern Impact	Water Quality Freshwater Biology Subsistence Cultural Resources Technical Feasibility	Vegetation Fish Wildlife Economic Feasibility	ELIMINATED
	Omikviorok Route		Water Quality Vegetation Wildlife Subsistence Cultural Resources Krusenstern Impact Technical Feasibility Economic Feasibility	Freshwater Biology Fish	ELIMINATED
	Kruz Route[3]	Water Quality Vegetation Freshwater Biology Wildlife Subsistence Technical Feasibility Economic Feasibility	Fish	Cultural Resouces Krusenstern Impact	
	Transportation Mode				
COMPARED	Railroad	Subsistence	Water Quality Air Quality Vegetation Freshwater Biology Fish Wildlife Cultural Resources Regional Use Krusenstern Impact	Recreation Technical Feasibility Economic Feasibility	ELIMINATED
	Road (year-round)[3]	Recreation Regional Use Technical Feasibility	Economic Feasibility Vegetation Freshwater Biology Fish Wildlife Subsistence Cultural Resouces Krusenstern Impact	Water Quality Air Quality	

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[1] Disciplines having the same level of potential impact for all options are not shown.

[2] Suboptions are compared only with other(s) for same corridor (i.e., GCO and Asikpak routes for northern corridor; western, Omikviorok and Kruz routes for southern corridor.)

[3] Proposed alternative.

Following the options screening process, the best option for mode of transport was relatively easy to identify. However, the route location had two options each which appropriately addressed one or more of the scoping issues. These options, shown in the following table, were carried through the comprehensive environmental impact assessment process.

TRANSPORTATION OPTIONS ELIMINATED DURING SCREENING PROCESS OR RETAINED FOR COMPREHENSIVE IMPACT ASSESSMENT

	Retained		Eliminated	
Transportation	Option	Suboption	Option	Suboption
° Route	Northern	Asikpak Route	Northern	GCO Route
	Southern	Kruz Route	Southern	Western Route Omikviorok Route
° Mode	Road	Year-Round	Railroad	

B. Identify Why Alternatives Were Eliminated

Each option and suboptions for the transportation route and mode identified during the scoping process was individually reviewed from environmental and technical perspectives. If an option (or suboption) was environmentally and technically reasonable, it was retained for further detailed analysis. If, however, the option (or suboption) was determined to be unreasonable or infeasible on environmental or technical grounds, and if other options retained adequately addressed the scoping issues, it was eliminated. The following table presents those options and suboptions eliminated during the initial review process and outlines the major reasons why each was eliminated.

MAJOR REASONS FOR ELIMINATION OF TRANSPORTATION OPTIONS AND SUBOPTIONS DURING INITIAL REVIEW PROCESS

Transportation	Option	Major Reasons for Elimination
° Route	Noatak Corridor	- Road would cross many lowlands with substantial permafrost and wetlands problems - Many stream crossings with associated impacts on water quality and fish
° Mode	Slurry Pipeline	- Cold weather slurry lines not yet feasible - High spill hazard - Slurry water disposal problems - Wasteheat from power generation couldn't be used to dry concentrates
	Hovercraft	- Units large enough to efficiently haul concentrates not yet available - Excessive fuel consumption - Noise levels reach 105 db - Substantial disturbance to wildlife
	Winter Road	- Unpredictability of snow availability - Annual construction of ice/snow bridges at river crossings pose erosion problems - Greater spill hazards at river crossings - Increased disturbance to wintering caribou - Less flexibility for other regional uses

Each of the remaining options (or suboptions) was then individually evaluated in detail from the perspective of each resource or technical discipline (e.g., water quality, subsistence, technical feasibility, etc.). For each discipline, or specific set of "options screening criteria" was developed against which each option (or suboption) was screened to identify potential impacts upon that discipline.

For each discipline, once each option for the transportation route and mode had been evaluated against all screening criteria, each option was then compared to other related options and a "relative level of potential impact" was assigned. It is important to understand that potential impacts were assigned relative to the other options for each project component (i.e., route and mode). The relative levels of potential impact were low, moderate and high.

It should be noted that the suboptions for the northern and southern transportation corridors, respectively, were compared only against the other suboption(s) for each of those corridors (i.e., the GCO route and the Asikpak route were compared only against each other for the northern corridor, and the western, Omikviorok and Kruz routes were compared only among themselves for the southern corridor). This was done to specifically address the Title 11 requirement that alternate routes around the Monument be fully evaluated in the EIS process. By comparing each corridor's routes only among themselves, the best route for each corridor was identified, thus guaranteeing that each corridor would be considered during the evaluation of alternatives process and be included in the alternatives for formal public review in the draft EIS.

In the next step of the process, the levels of potential impact for all disciplines were grouped for each option. This provided a combined picture of the individual levels of potential impact.

The final step of the option screening process was to select the best option for the route and mode of transportation. This was done by determining the option which showed the lowest overall level of potential impact (the lower the potential level of impact, the better the option). That option was then selected unless one of the other options for that component more favorably addressed one or more of the scoping issues.

In the case of the transportation route, two options (one for each corridor) appropriately addressed one or more) of the scoping issues and therefore, both were retained. The Asikpak route to Tugak Lagoon was selected as the best suboption for the northern corridor as was the Kruz route to VABM 28 for the southern corridor.

For the mode of transportation, the railroad initially appeared to have a lower overall level of potential impact. However, analysis showed that several of the individual discipline differences were either not significantly different, or could be mitigated or eliminated by construction or operational procedures. The road was finally selected on the bases of greater regional use flexibility, substantially less capital cost, and the fact that the transportation corridors would be initially laid out to meet the more restrictive railroad grade constraints, thus keeping open the option for construction of a railroad within the same right-of-way at a later time.

The evaluation criteria were applied separately to the two route options to determine a "relative total impact value" (low, moderate or high) for each. It is important to note that the relative total impact value assigned to each option was derived only by evaluation of that option relative to the other for each criterion, and thus does not necessarily represent the absolute impact. The northern Asikpak route was not selected because it would present a relatively higher level of total impact than the southern Kruz route. An accounting of the relative total impact follows.

RELATIVE TOTAL IMPACT VALUES ASSIGNED TO THE TWO TRANSPORTATION ROUTE OPTIONS[1]

Evaluation Criteria	Southern Kruz Route	Northern Asikpak Route
1. Risk of Water Quality Deterioration		Higher Risk
2. Impact to Fish and Fish Habitat		Higher Impact
3. impacts to Wildlife and Wildlife Habitat		Higher Impact
4. Impact to Traditional Subsistence Harvest Activities		Higher Impact
5. Impact on Cape Krusenstern National Monument	Higher Impact	
6. Technical Complexity		Higher Complexity
7. Cost		Higher Cost

[1] Potential impact to other resources (i.e., coastal geologic processes; marine life and marine habitat; cultural resources; and local social, cultural and economic conditions) would be similar for both options.

The southern Kruz route rated inferior to the northern route only for impacts to the Monument, while the northern route rated inferior to the southern route for water quality, fish, wildlife, subsistence, technical complexity and cost. Based on these, relative impacts, and considering the southern route would not significantly impact the Monument, it was determined that the northern transportation route would not present a prudent option for the development of an access route to the Red Dog Project.

QUESTION 14:

List Required Authorizations to Allow Construction of the Project

Before construction and operation of the Red Dog Project can begin, Cominco must obtain several federal and state approvals. The major permits or other approvals include:

Federal Government*

U.S. Environmental Protection Agency (EPA)

- ° National Pollutant Discharge Elimination System Permit (NPDES)

U.S. Army Corps of Engineers (COE)

- ° Section 404 Permit (wetlands)
- ° U.S. COE Section 10 (port site)

U.S. National Park Service (NPS)

- ° Right-of-Way for Transportation System

Other permits which are needed for construction but fall outside Title 11 jurisdiction:

- ° U.S. EPA NPDES Water Quality Permit (mine)
- ° U.S. COE Section 404 (mine site)

U.S. Fish and Wildlife (FWS)

- ° Possible Section 7 Consultation (for the endangered peregrine falcon)

National Marine Fisheries Service (NMFS)

- ° Possible Section 7 Consultation (for endangered marine mammals)

State of Alaska

Department of Environmental Conservation (DEC)

- ° Air Quality Permit to Operate
- ° Certificate of Reasonable Assurance (Water Quality)
- ° Wastewater Disposal Permit
- ° Solid Waste Disposal Permit

Department of Fish and Game (ADF&G)

- ° Title 16 Anadramous Fish Stream Permit

* There are State of Alaska approvals which must be obtained as part of the federal permit decisions.

Department of Natural Resources (DNR)

- Right-of-Way Permit
- Water Rights Permit
- Tidelands Use Permit
- Tidelands Lease
- Materials Sale Contract

State Historic Preservation Office (SHPO)

- Archaeological Clearance

Governor's Office of Management and Budget, Division of Governmental Coordination

- Coastal Zone Management Consistency Determination

Local Government

North Slope Borough (NSB)

- Land Use Permit

QUESTION 15:

Statement of Need

The proposed route represents the most logical siting of the transportation corridor to provide access to the Red Dog Project. The mine represents a significant economic stimulus to the NANA region and individual shareholders of the NANA Regional Corporation. Congress clearly encouraged the development of this mine when the land was withdrawn from the Noatak Preserve and made available to the Regional Corporation for selection.

The proposed route would have the least potential environmental impact of all the routes considered along with the least potential to adversely effect existing subsistence activities in the project area.

The proposed route would cost approximately $74.7 million for the entire corridor from Red Dog to the sea. The next most acceptable route which would avoid the National Monument would cost approximately $125.7 million. In addition, the more expensive corridor would have significantly greater impacts to wildlife, fisheries and subsistence values. The project would provide jobs for an economically depressed area of Alaska. However, without a prudent and cost-effective route to the coast, development of the mine would not occur in the foreseeable future.

The benefits to the public would be represented through the construction of an environmentally acceptable route which could serve the Red Dog Project and other potential mining operations in the district. The Red Dog area represents one of the most significant undeveloped mineralized areas in the United States. The proposed route will provide access to this district in a manner compatible with the existing lifestyle in the region and the aims of Congress in the protection of resources as outlined in the Alaska Lands bill.

QUESTION 16:

Effect on the Population of the Area

The potential effect on existing socio-economic characteristics of the NANA region can only be predicted based on the total Red Dog Project.

The Red Dog mine would provide permanent, year-round employment in a developing region with substantial unemployment. The project management, as expressed by the NANA-Cominco agreement, places high priority on policies and practical steps designed to make feasible a high rate of resident hire. Apart from the mine, there are no projects in the region that seem likely to improve economic or job conditions to a significant extent. At final capacity, the project would contribute about 547 jobs and an annual payroll of $8.4 million to NANA region residents. For comparison, the Alaska Department of Labor reports that in 1982, the average annual employment for the Kobuk census division was 1,863 employees, with a total annual payroll of $39.0 million. Thus, compared to 1982 levels, the mine at final production would increase resident employment by about 29 percent and resident earnings by about 30 percent. The project would also create about 248 construction jobs and about 157 permanent production jobs for workers commuting from other areas of the state, plus an undetermined number of secondary jobs.

The economic impact of the project would accelerate during construction and then level off as production began. Sudden prosperity might cause some transitional problems (e.g., price and labor inflation) in the local economy; until the local supplies of goods and services and labor adjusted to meet new consumer demand. For the long run, however, it seems probable that economic growth would promote local diversification and economies of scale to offset short-term inflation.

It is estimated that the mining project would eventually add about 354 persons to the total population of the region above the baseline forecast without the mine. Much of this growth would occur at the early stages of the project. This would include an estimated 118 new resident workers, plus their households. It is assumed that Kotzebue's more developed commerce, transportation and community facilities and services would make it more appealing to newcomers than the smaller remote communities. Therefore, nearly all (about 90 percent) of these new residents would probably reside in Kotzebue, with the rest dispersed among the other rural villages.

Recent decades show a pattern of intraregional migration to Kotzebue from its hinterland villages, but this trend appears to be leveling off. The effects of mine project on population movements within the region are, at best, speculative. On the one hand, Kotzebue's more developed cash economy and community services may prompt some migration there of village residents working at the mine. However, provision for direct commuting rather than via Kotzebue, plus a preference of village residents to use new income to make their families better off in their home communities might neutralize this tendency. A best guess is that the project would not have much net effect on intraregional population movement.

QUESTION 17:

Information provided for item 17 will focus on likely environmental effects of only those components of the project (i.e., transportation route and mode) directly associated with Cape Krusenstern National Monument. Potential environmental impacts associated with the project in its entirety have been fully assessed in the project Environmental Impact Statement (EIS). Please refer to this document for a discussion of potential impacts other than those directly associated with the Monument:

A. Air Quality

Vehicle traffic on the road would be the only source of pollutant emmissions within the Monument. Pollutant emmissions from these vehicles would not reach significant levels even under the worst of atmospheric conditions. Dust generation, however, could effect directly surrounding vegetation.

B. Visual

The degree of visual impact of the road port site and transfer facility would be dependent on the attitude of the viewers. While present visitor use of this portion of the Monument is very low (i.e., less than five visitors per year from outside the region), the road port site and the transfer facility would be obvious to viewers from most parts of the western portion of the Monument.

The proposed port site and transfer facilities would be located in partial retention VQO areas, although port site facilities would be located on private land, and the VRM Program is not applicable to private land. The layout and colors of the port facility could however be made to conform with the VQO to mitigate much of the visual impact. The visual impact of the large ballasted tanker would be high, but not significant considering the purposes for which the Monument was established. The partial retention VQO could also be achieved here if appropriate visual quality considerations were made during facility design.

C. Surface and Groundwater Quality and Quantity

Potential groundwater impacts associated with the road would primarily involve the risk of groundwater contamination from fuel and chemical spills. Soils containing groundwater might then act as conduits for contaminant migration to nearby streams. Travel time between a spill site and a nearby stream would depend on the location of the spill, the substance spilled and the nature of intervening soil materials. Spillage control plans and rapid response to spills would be the primary mitigative measures. The SPCC Plan outlines the proposed draft plan for spill reaction.

Within the Monument, the road would have only one major bridge crossing the Omikviorok River and 20 minor bridge or culvert crossings. Assuming proper methods of construction and drainage control are followed, environmental impacts would be insignificant. The road construction and maintenance guidelines described below and elsewhere in the application would largely protect against water quality degradation due to sediment. The Red Dog mine project would follow acceptable guidelines for road construction in the Arctic.

The road would be constructed to protect the thermal regime. It would generally be composed of a 2.0 m (6.5 ft) deep layer of crushed rock or 0.6 m (2 ft) of crushed rock over 7 cm (3 in) of insulation. These specifications would prevent permafrost thawing and resulting severe erosion problems. Borrow areas would be situated to minimize potential water quality impacts on local drainages. Buffer strips and sedimentation ponds would be used at rock quarry areas to protect water quality. Haul roads for construction materials would receive special attention due to their temporary nature and potential for tundra and permafrost damage.

D. Control or Structural Change on any Stream or other Body of Water

Information pertinent to this item has been included under item (c) above. However, the possibility of development of a port facility has raised questions concerning potential impact upon the historic beach ridges at Cape Krusenstern, although no project related facility actually within the Monument would affect the transport of coastal sediments. Location of a port site at VABM 28 with a short causeway and ballasted tanker would have only a relatively minor and local effect on sediment transport, and no significant effect on the Cape Krusenstern beach ridges. (See Woodward/Clyde, October 1983 "Coastal Transport Cape Krusenstern to Cape Thompson".)

E. Noise

The road would be used consistently for nine to twelve round trips per day by concentrate truck/trailer units. Additional daily tanker and supply truck trips and one or two trips per day by light utility vehicles would occur. Sound levels from the road would be intrusive (to human conversation) under optimum propagation conditions (low temperature inversion) out to a distance of 0.8 km (0.5 mi) and discernible to the human ear up to 8 km (5 mi) from the road.

Noise disturbance to visitors at Cape Krusenstern National Monument would be unavoidable within 8 km (5 mi) of the road. The relative briefness of any potential exposure and the present infrequent visitation to this portion of the Monument would suggest that noise impacts due to traffic on the road would not be significant.

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F. Surface of the Land (Vegetation, Permafrost, Soil & Soil Stability)

Much information pertinent to this item has been included in the discussion under item (c) above. Other effects include direct loss of vegetation and potential changes in the ground cover due to human activity, dust and compaction. Road construction through the Monument would destroy approximately 77 ha (190 ac) of vegetation; generally avoiding the more valuable wetland areas. Any off-road foot or vehicle traffic on snow covered ground might result in compaction and late melting or impeded drainage and increased erosion. Direct damage to uncovered vegetation might include breakage of plant parts, depression of the ground surface, ponding and increased erosion.

QUESTION 18:

A. Populations of Fish, Plant, Wildlife, and Marine Life (Threatened & Endangered Species)

The road would cross the Omikviorok River at least once on three of its five forks and once on the upper part of the main stem. The lower portion of the river provides spawning and rearing habitat for char. Tributaries to the Omikviorok River would also be crossed, but none of these tributaries is known to contain fish in the vicinity of the road crossings. New Heart Creek would also be crossed and is known to contain Arctic char. Both the Omikviorok River and New Heart Creek flow into Ipiavik Lagoon where some subsistence fishing occurs. These systems are less critical than the Wulik and Kivalina River drainages, but should be afforded the protection of proper crossing site selection, crossing design and construction timing.

The road would cross approximatley 38 km (24 mi) of the Monument, and approximately 77 ha (190 ac) of vegetation would be destroyed by actual road construction. A large percentage of the vegetation destroyed would consist of tussock tundra, low shrublands and complexes of both. The more valuable wetlands (e.g. waterfowl habitat) would generally be avoided. Three candidate threatened or endangered plant species had the potential for occurrence in the project area, but none were found during extensive field surveys from 1981 to 1983. Impacts are not considered regionally significant as the loss would be small, relative to the total of similar resources in the area. Maximum dust fall might occur to a distance of approximately 300 m (984 ft) from the road, impacting roadside vegetation. Mosses and lichens would be most susceptible and might, with other heath and herbaceous plants, experience a loss of vitality along the road. Other taxa, for example cottongrasses, might increase in relative abundance in the roadside environment (Brown et. al 1980).

Construction of the road could cause a significant loss of habitat for song bird and small mammal species, but it would not be significant on a greater than local basis. For birds of prey and larger mammal species, direct habitat loss would not be significant even on a local basis. Indirect habitat loss, however, would be of significance on a greater than local basis. While local song bird and small mammal populations would likely accommodate to the presence of the road and associated activities, birds of prey and larger mammals would generally be affected to differing degrees by avoiding the area.

Indirect habitat loss would likely be significant for caribou on a local basis, and could even be of greater than local significance. The southern corridor passes between primary caribou low tussock tundra winter range in the Wulik and Kivalina lowlands, and secondary winter range on the more wind-swept slopes of the Mulgrave Hills to the southeast. Road activity would cause avoidance of the corridor, and hence displacement, thereby limiting to some extent the use of otherwise available winter habitat. There would also likely be some mortality due to vehicle collisions or added stress from winter traffic. (It should be noted that any route chosen within the project area would have at least the same level of impact or greater.)

The Cominco/NANA agreement specifically recognizes the possibility of major caribou migration interruptions. NANA has retained the authority to suspend operation of the project during periods when caribou movements are imminent to minimize the possibility of such interruptions.

Two nest sites of the endangered peregrine falcon have been reported along the corridor in the Monument. The road alignment has been altered to provide a buffer of at least 3.2 km (2 mi) around the peregrine nests. Aside from road construction disturbance that might cause nest abandonment during the first two years of project development, long-term raptor breeding would likely not be seriously affected by road activity because of the distances from the nests.

Limited waterfowl habitat exists along the southern corridor. The road would cause no significant direct habitat loss, and relatively little in direct habitat loss. The major impact would be from long-term increased human access to the area, particularly by hunters or other visitors who might disturb molting or staging Canada geese.

B. Marine Mammals

Not applicable.

ATTACHMENT B

Access corridor map

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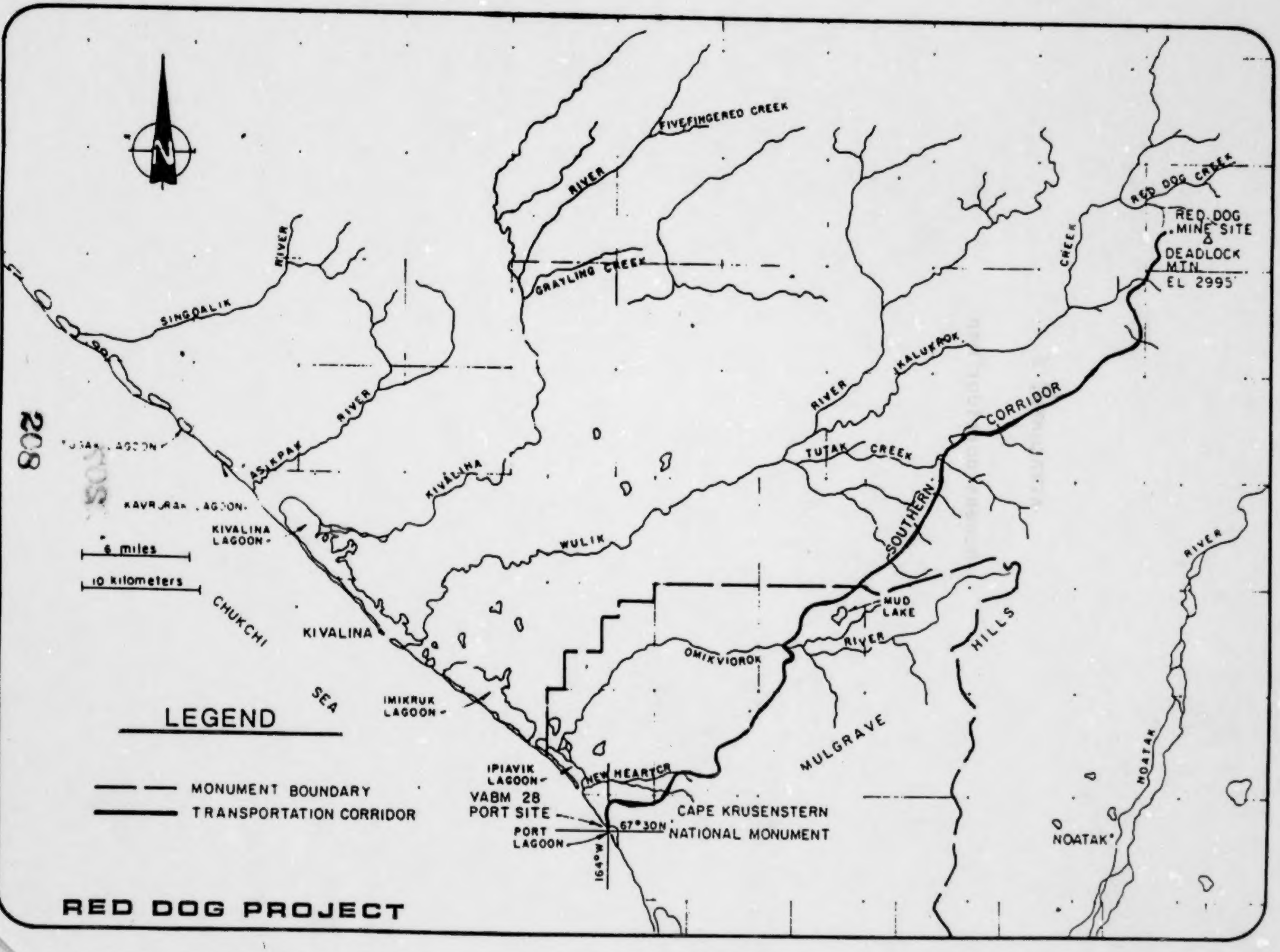


RED DOG PROJECT

N
FIVEFINGERED CREEK
RIVER
RED DOG CREEK
RED DOG
MINE SITE
DEADLOCK
MTN.
EL 2995'
SINGOALIK
RIVER
GRAYLING CREEK
CREEK
IKALUKROK
RIVER
CORRIDOR
TUTAK CREEK
SOUTHERN
UGAK LAGOON
ASIKPAK
RIVER
KIVALINA
KAVRORAK LAGOON
KIVALINA
LAGOON
WULIK
6 miles
10 kilometers
CHUKCHI
SEA
KIVALINA
RIVER
MUD
LAKE
OMIKVIOROK
RIVER
HILLS
IMIKRUK
LAGOON
LEGEND
MONUMENT BOUNDARY
TRANSPORTATION CORRIDOR
MULGRAVE
IPIAVIK
LAGOON
NEW HEART CR
VABM 28
PORT SITE
PORT
LAGOON
67°30N
164°W
CAPE KRUSENSTERN
NATIONAL MONUMENT
NOATAK
NOATAK

ATTACHMENT C

Corps of Engineers

Permit #

071-04D-2-830359

Chukchi Sea 9

Section 10/404

Background Data

RED DOG PROJECT
SUPPORTIVE INFORMATION FOR 404/SECTION 10 PERMIT APPLICATION

Reference No. 071-04D-2-830359

Waterway No. Chukchi Sea 9

Applicant: H. M. Giegerich, President, Cominco Alaska,
5660 "B" Street, Anchorage, AK 99502

LOCATION

Work

The proposed project will include the construction of a road and port site for the Red Dog Mine. The road will be 56.7 miles long with a total of 28 turnouts (4,000 cubic yards average fill per turnout). The turnouts will be 50 feet wide and 350 feet long. See attached sheets for additional information. Specific permits will be sought later in the permit process for the barrow sites.

The average depth of the road will be 30 feet wide with 6 feet of aggregate subbase (3,866,000 cubic yards) the exact location of the barrow sites have not as yet been determined. However, the general locations of the barrow sites are presented on the attached plans. Please refer to pages 3 and 4 for more specific information on barrow sites.

There are a total of 175 culvert crossings with each crossing requiring 1,500 cubic yards of material. There are two bridge crossings with an average fill requirement of 8,000 cubic yards. The one major stream crossing is the Omikviorok River with a multiple bridge span of greater than 100 feet. See the road plans for additional information.
The port will consist of the construction of concentrate transfer facility, dock, upland port facility, and a concentrate storage building.

The concentrate transfer facility will consist of ballasting a large ship on the sea floor approximately 4,000 feet offshore. The ship will be ballasted in 35 feet of water and will be used to transfer lead and zinc concentrate from the dock to ocean going ships. The area dredged for such an action would be 1,000 feet by 150 feet by 5 feet deep, with the dredged material pumped into the ship's wing tanks to act as ballast (total of 25,000 cubic yards). In addition, 1,000 feet to the north, an area 1,000 feet by 200 feet by 10 feet deep will be dredged to supply ballast for the tanker (total of 75,000 cubic yards). There would be no onshore storage of dredged material. (See attached plans for additional information.)

The dock will be 400 feet long and extend to 12 feet of water offshore. Twenty-nine thousand (29,000) cubic yards of fill would be needed for the dock, including armor rock located at the toe of the structure.

The upland port site will be used as a staging area for concentrate shipping, the movement of mine supplies, and building materials. The pad will be 510 feet by 265 feet and 10 feet deep. The total fill required is 63,000 cubic yards.

The concentrate storage building will be located on the excavated barrow site approximately 2.5 miles from the shore side facility. The building will be 912 feet by 180 feet by 80 feet tall. No fill will be required.

The opening of the port lagoon would require the dredging of an opening which would be 60 feet by 370 feet by 12 feet. A total of 15,000 cubic yards of material would be moved. This would be done to allow access to the lagoon for the construction barge to be used in the initial development of the road and port.

Purpose

The purpose of the permit request is to develop a road and port for the building and operation of the Red Dog Mine. The road will be an industrial use road constructed to carry 150 ton trucks which will move lead/zinc concentrate from the mine to the port. The road would carry up to 12 truck trips per day plus other assorted mine related vehicle trips.

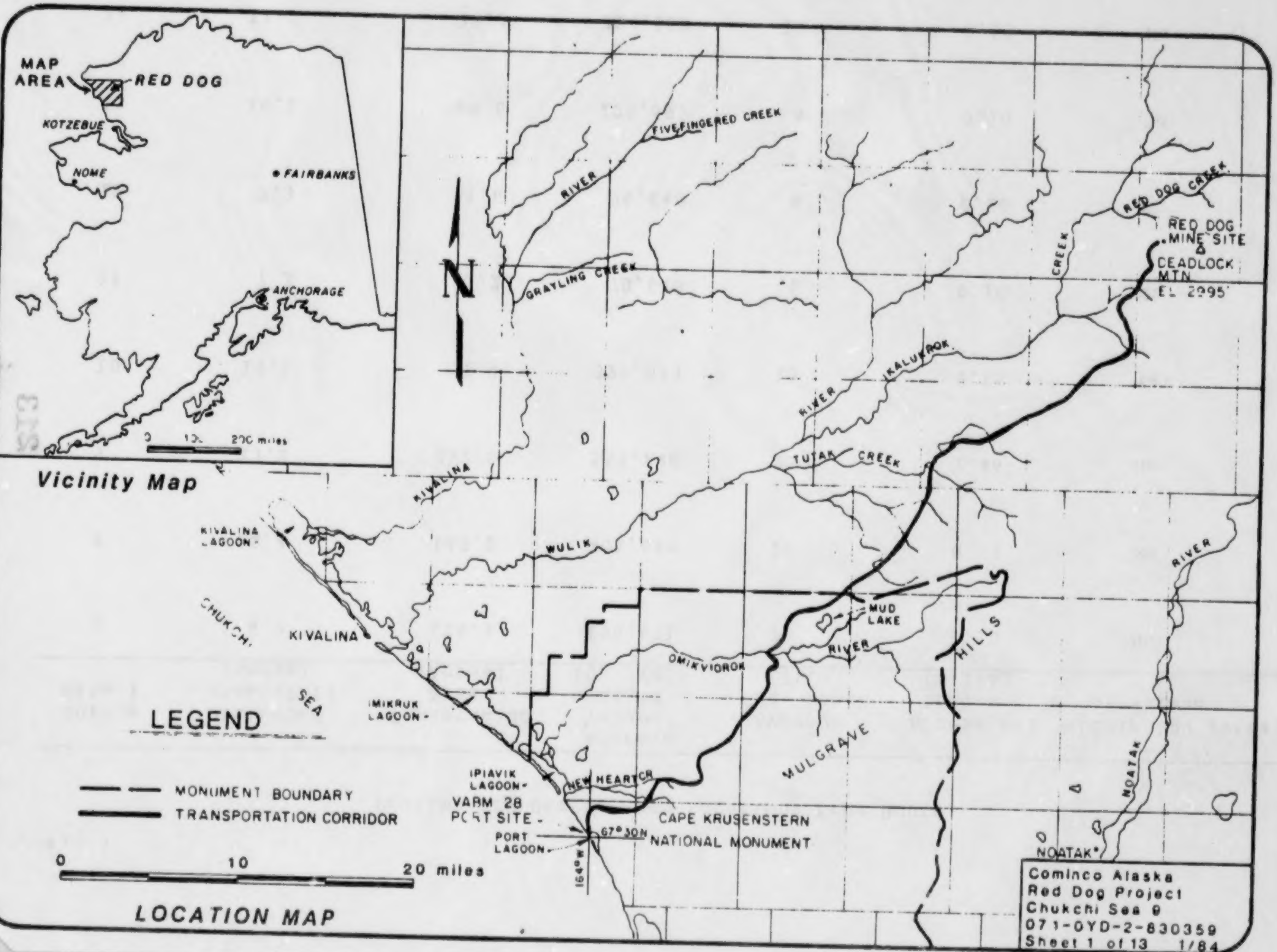
The port would function approximately 4 months of the year and would act as the incoming and outgoing point for all material for the Red Dog Mine. Please refer to the Preliminary Draft EIS for additional details.

Preliminary Barrow Area Locations Kruz Route

Borrow Site #	Disturbed Area (Pit) (Acres)	Exploration Area (Acres)	Average Volume Req'd (Cu. Yd.)	Average Exc. Depth (Ft.)	Access Rd. Length (miles)	Within 100 yards of stream
1	48.0	211.2	400,043	7.0	0.12	No
2	23.4	121.6	378,188	10.0	0.24	No
3	-	140.8	-	-	-	No
4	12.8	243.2	248,760	16.0	0.80	No
5	34.4	192.0	771,826	14.0	0.67	No
6	-	403.2	-	-	-	Yes

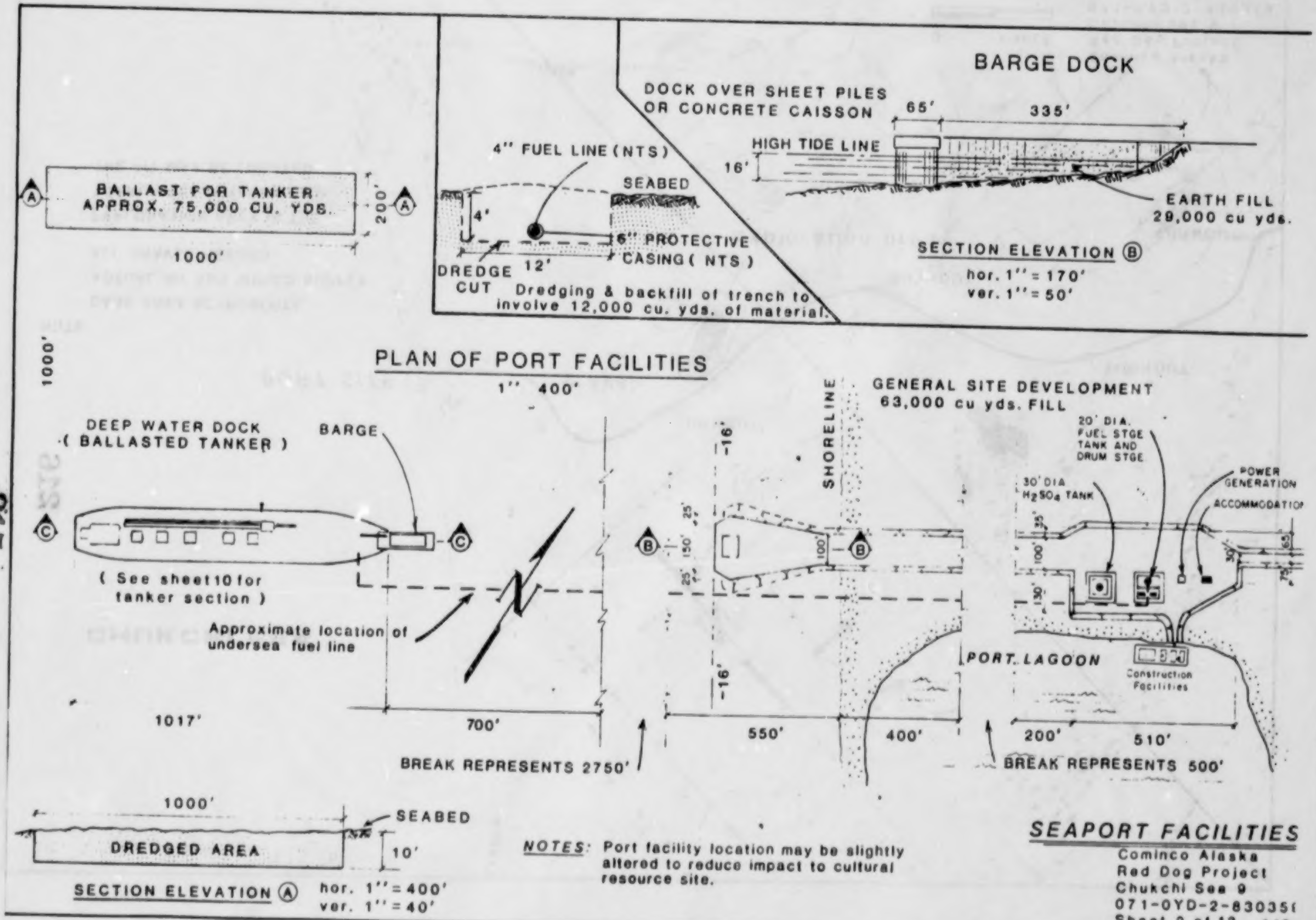
Preliminary Barrow Area Locations Kruz Route

Borrow Site #	Disturbed Area (Pit) (Acres)	Exploration Area (Acres)	Average Volume Req'd (Cu. Yd.)	Average Exc. Depth (Ft.)	Access Rd. Length (miles)	Within 100 yards of stream
7	6.0	166.4	195,471	20	0.30	No
8	12.4	147.2	401,669	20	0.66	No
9	13.8	217.6	553,140	25	2.46	No
10	15.5	51.2	322,543	13	0.15	Yes
11	7.3	51.2	70,640	6	0.10	No
12	7.3	41.6	70,640	6	0.10	No
13	16.1	89.6	228,697	9	0.10	No
14	11.5	38.4	224,580	12	0.05	No


MAP AREA
RED DOG
KOTZEBUE
NOME
FAIRBANKS
ANCHORAGE
0 100 200 miles
Vicinity Map
FIVEFINGERED CREEK
RIVER
GRAYLING CREEK
N
CREEK
RED DOG CREEK
RED DOG MINE SITE
DEADLOCK MTN
EL 2995'
IKALUKROK
RIVER
TUTAK CREEK
KIVALINA
WULIK
KIVALINA LAGOON
CHUKCHI SEA
KIVALINA
IMIKRUK LAGOON
MUD LAKE
RIVER
OMIKVIOROK
HILLS
MULGRAVE
RIVER
NOATAK
NOATAK
IPIAVIK LAGOON
VABM 28 PORT SITE
PORT LAGOON
NEW HEART CR
67°30N
164°W
CAPE KRUSENSTERN NATIONAL MONUMENT
LEGEND
MONUMENT BOUNDARY
TRANSPORTATION CORRIDOR
0
10
20 miles

LOCATION MAP

Cominco Alaska
Red Dog Project
Chukchi Sea 9
071-OYD-2-830359
Sheet 1 of 13 1/84


BALLAST FOR TANKER
APPROX. 75,000 CU. YDS.
A
200'
1000'
4" FUEL LINE (NTS)
SEABED
4'
12'
6" PROTECTIVE CASING (NTS)
DREDGE CUT
Dredging & backfill of trench to involve 12,000 cu. yds. of material.
BARGE DOCK
DOCK OVER SHEET PILES OR CONCRETE CAISSON
65'
335'
HIGH TIDE LINE
16'
EARTH FILL 29,000 cu yds.
SECTION ELEVATION B
hor. 1'' = 170'
ver. 1'' = 50'
PLAN OF PORT FACILITIES
1'' 400'
1000'
DEEP WATER DOCK
(BALLASTED TANKER)
BARGE
C
(See sheet 10 for tanker section)
Approximate location of undersea fuel line
1017'
700'
BREAK REPRESENTS 2750'
-16'
-16'
25'
150'
25'
100'
SHORELINE
550'
400'
GENERAL SITE DEVELOPMENT
63,000 cu yds. FILL
20' DIA. FUEL STGE TANK AND DRUM STGE
30' DIA H_2SO_4 TANK
POWER GENERATION
ACCOMMODATIO
25'
100'
30'
30'
65'
75'
PORT LAGOON
Construction Facilities
200'
510'
BREAK REPRESENTS 500'
1000'
SEABED
DREDGED AREA
10'
SECTION ELEVATION A
hor. 1'' = 400'
ver. 1'' = 40'

NOTES: Port facility location may be slightly altered to reduce impact to cultural resource site.

SEAPORT FACILITIES

Cominco Alaska
Red Dog Project
Chukchi Sea 9
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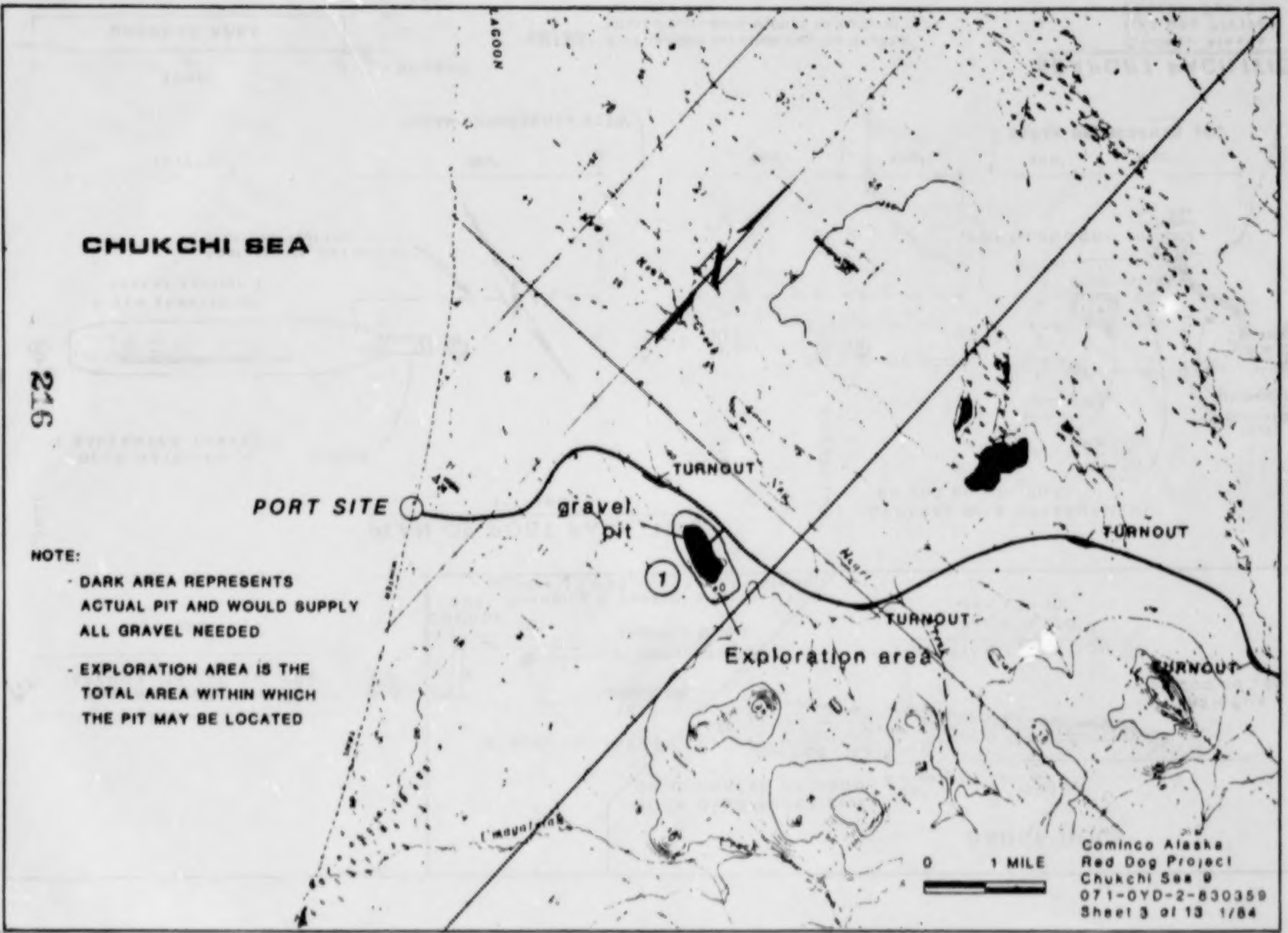
Sheet 2 of 13 1/8


CHUKCHI SEA
LAGOON
PORT SITE
gravel pit
1
TURNOUT
TURNOUT
TURNOUT
TURNOUT
Exploration area
0
1 MILE

NOTE:

- DARK AREA REPRESENTS ACTUAL PIT AND WOULD SUPPLY ALL GRAVEL NEEDED
- EXPLORATION AREA IS THE TOTAL AREA WITHIN WHICH THE PIT MAY BE LOCATED

Cominco Alaska
Red Dog Project
Chukchi Sea 9
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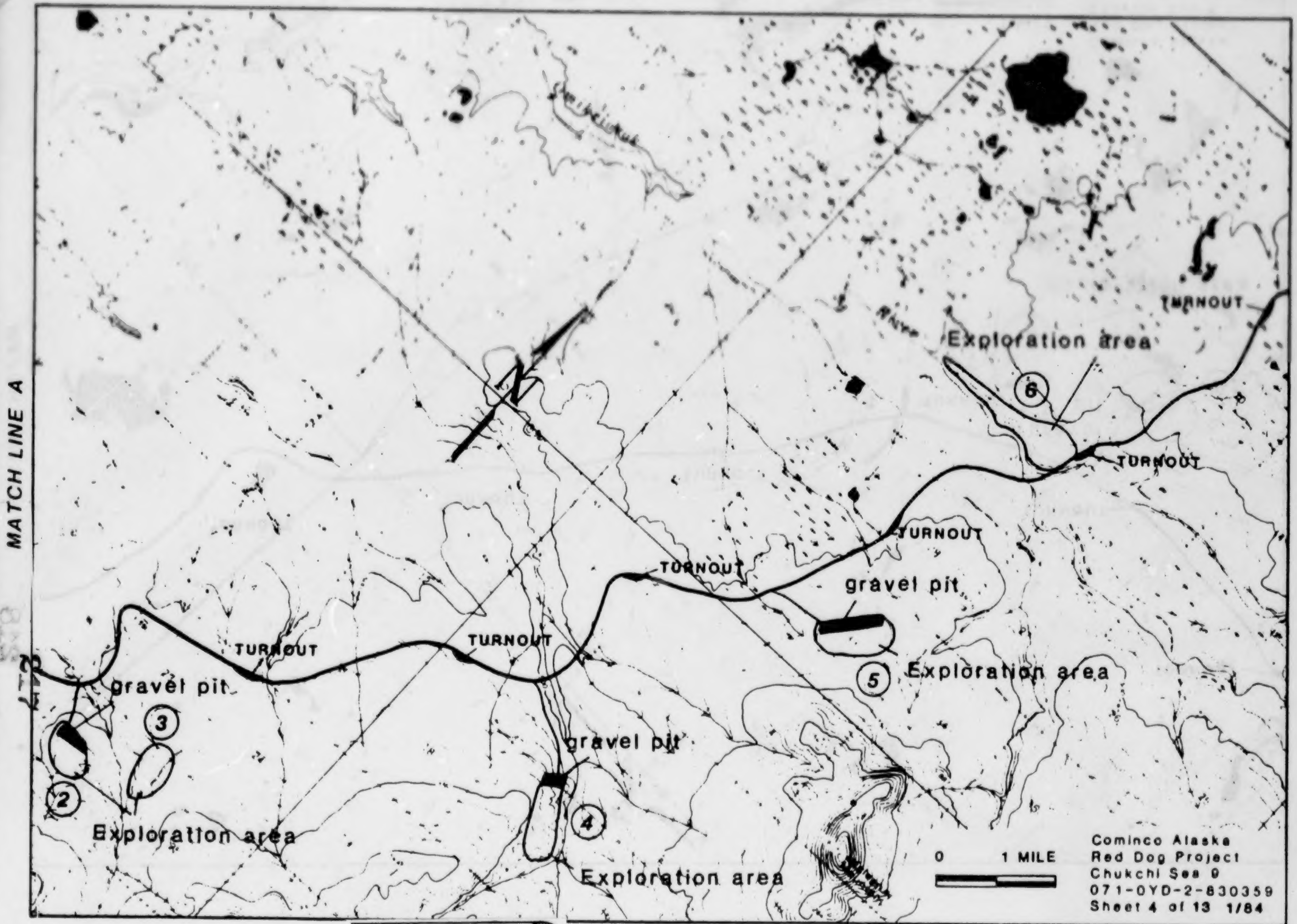
MATCH LINE A
TURNOUT
TURNOUT
TURNOUT
TURNOUT
TURNOUT
TURNOUT
gravel pit
gravel pit
gravel pit
Exploration area
Exploration area
Exploration area
Exploration area
Exploration area
2
3
4
5
6
N
0
1 MILE

Cominco Alaska
Red Dog Project
Chukchi Sea 9
071-0YD-2-830359
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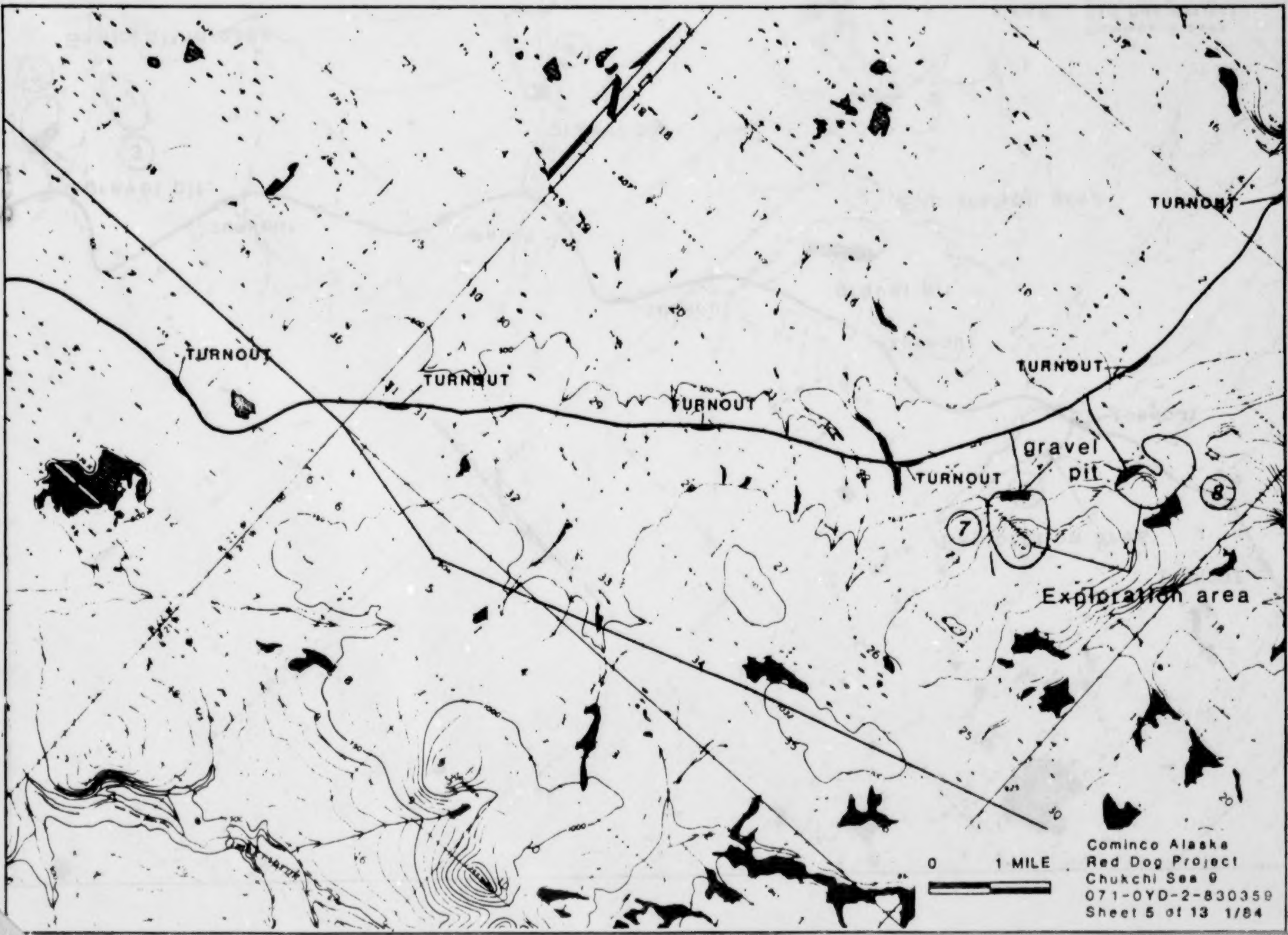
MATCH LINE B
TURNOUT
TURNOUT
TURNOUT
TURNOUT
TURNOUT
TURNOUT
gravel pit
⑦
⑧
Exploration area
0
1 MILE
Cominco Alaska
Red Dog Project
Chukchi Sea 9
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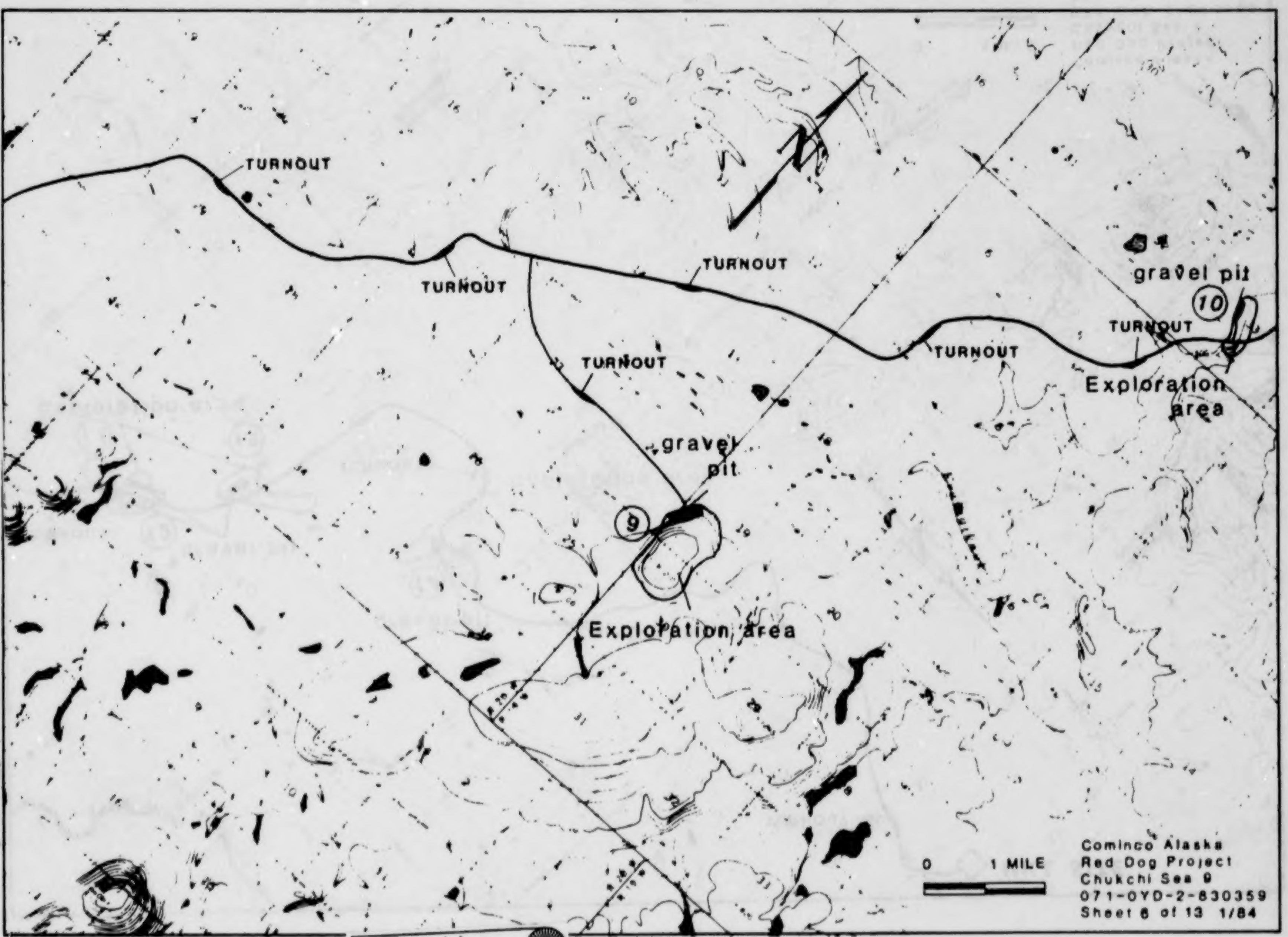
MATCH LINE C


TURNOUT
TURNOUT
TURNOUT
TURNOUT
TURNOUT
TURNOUT
gravel pit
10
Exploration area
gravel pit
9
Exploration area
0
1 MILE

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Red Dog Project
Chukchi Sea 9
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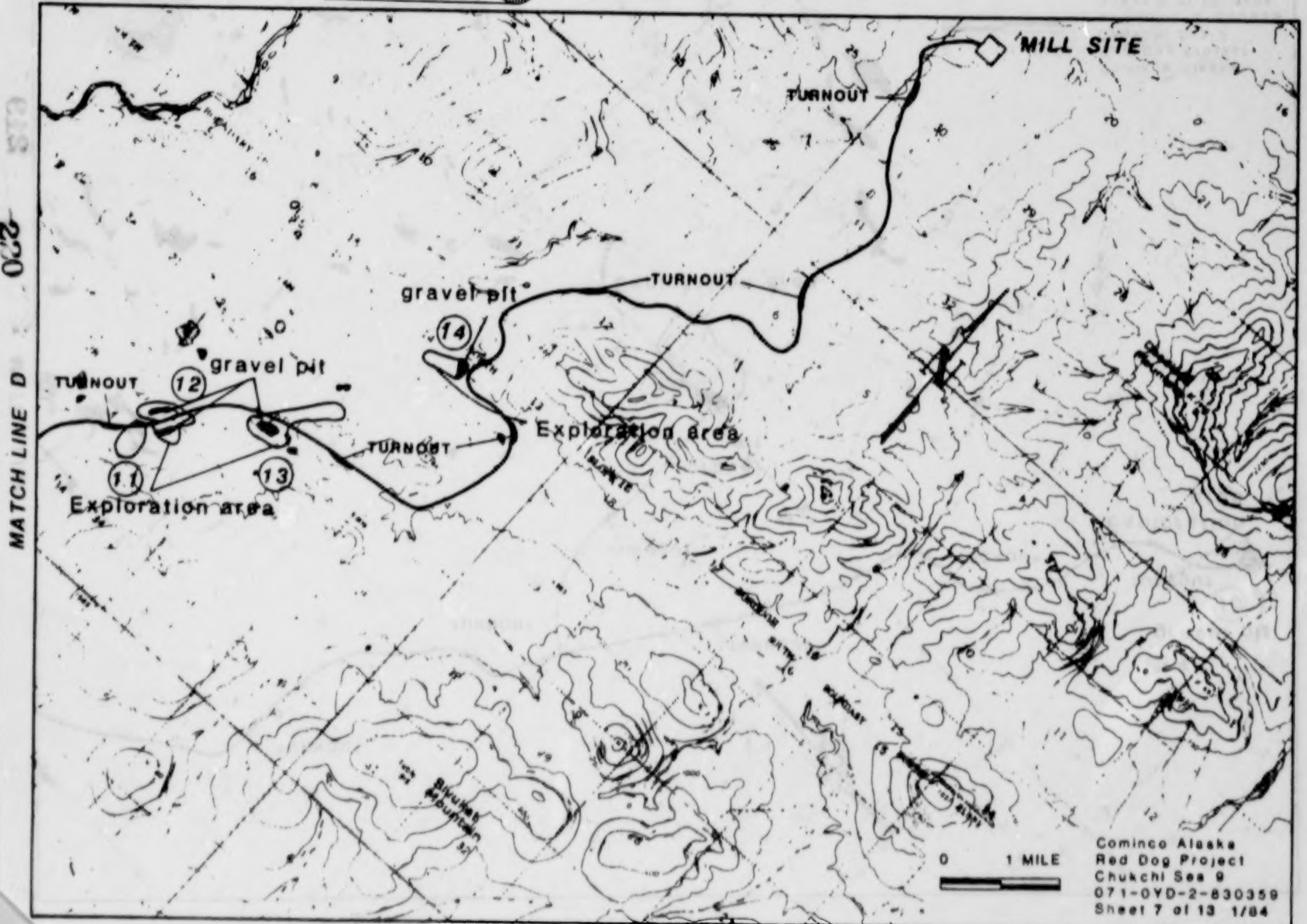
MATCH LINE D
MILL SITE
TURNOUT
TURNOUT
gravel pit
14
TURNOUT
12
gravel pit
Exploration area
TURNOUT
11
13
Exploration area
0
1 MILE

Cominco Alaska
Red Dog Project
Chukchi Sea 9
071-OYD-2-830359
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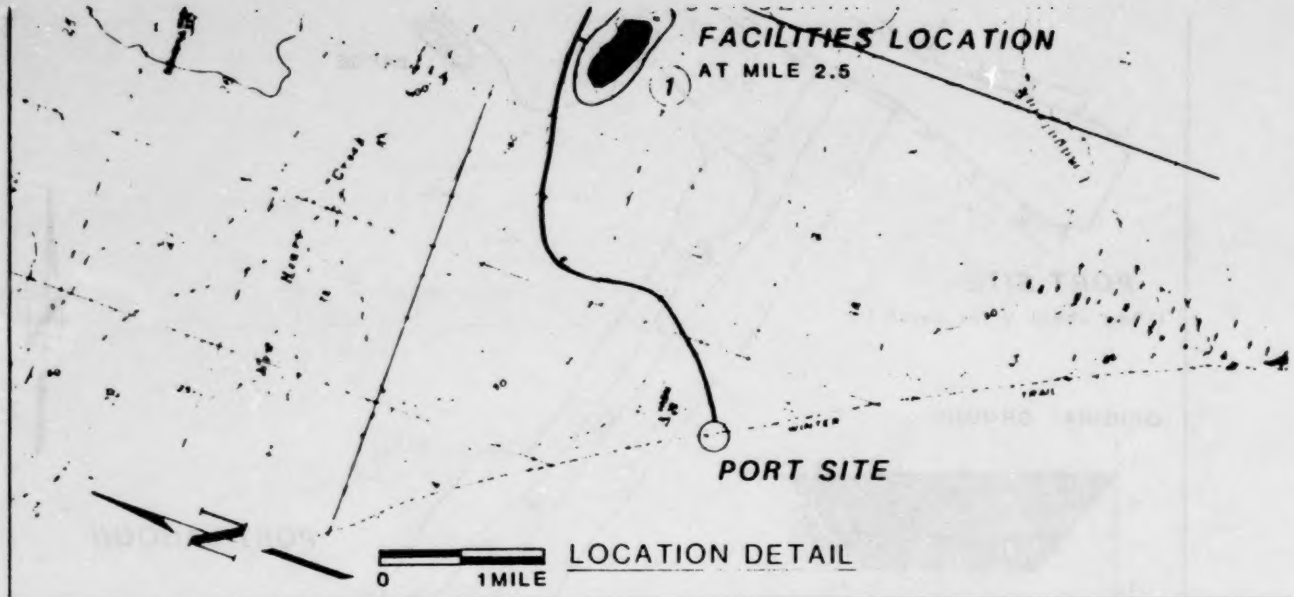
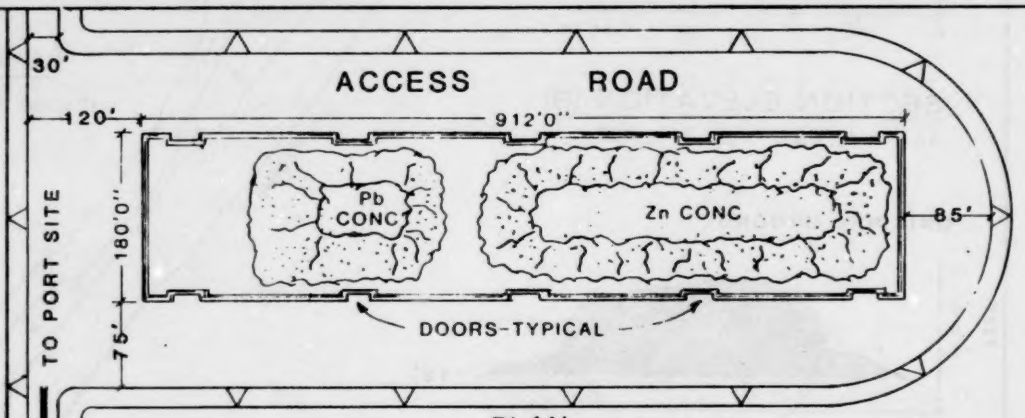
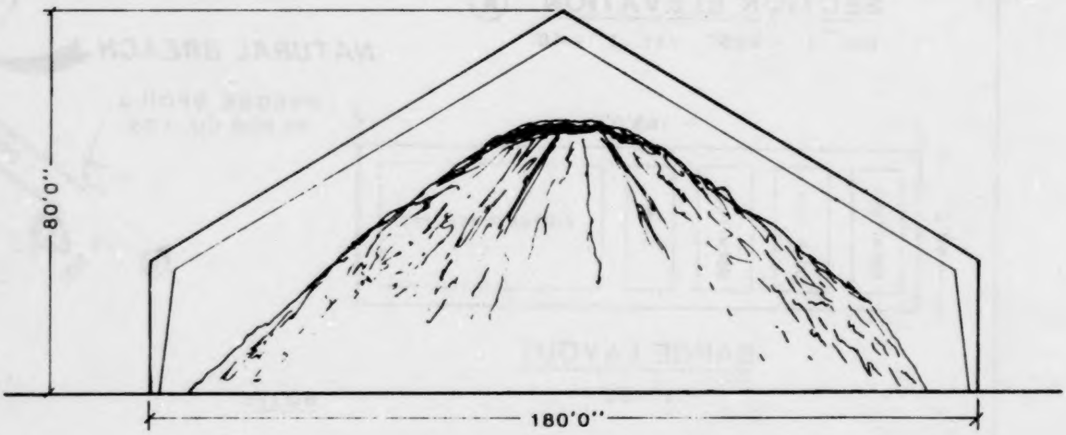

FACILITIES LOCATION
AT MILE 2.5
1
PORT SITE
0
1MILE

LOCATION DETAIL


ACCESS ROAD
30'
120'
912'0"
180'0"
75'
85'
Pb CONC
Zn CONC
DOORS-TYPICAL
TO PORT SITE

PLAN

1" = approx. 170'



SECTION ELEVATION

1" = 35'

CONCENTRATE STORAGE

FACILITY BUILT ON BEDROCK OF
FORMER BARROW SITE AT PT. ①

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Red Dog Project
Chukchi Sea 9
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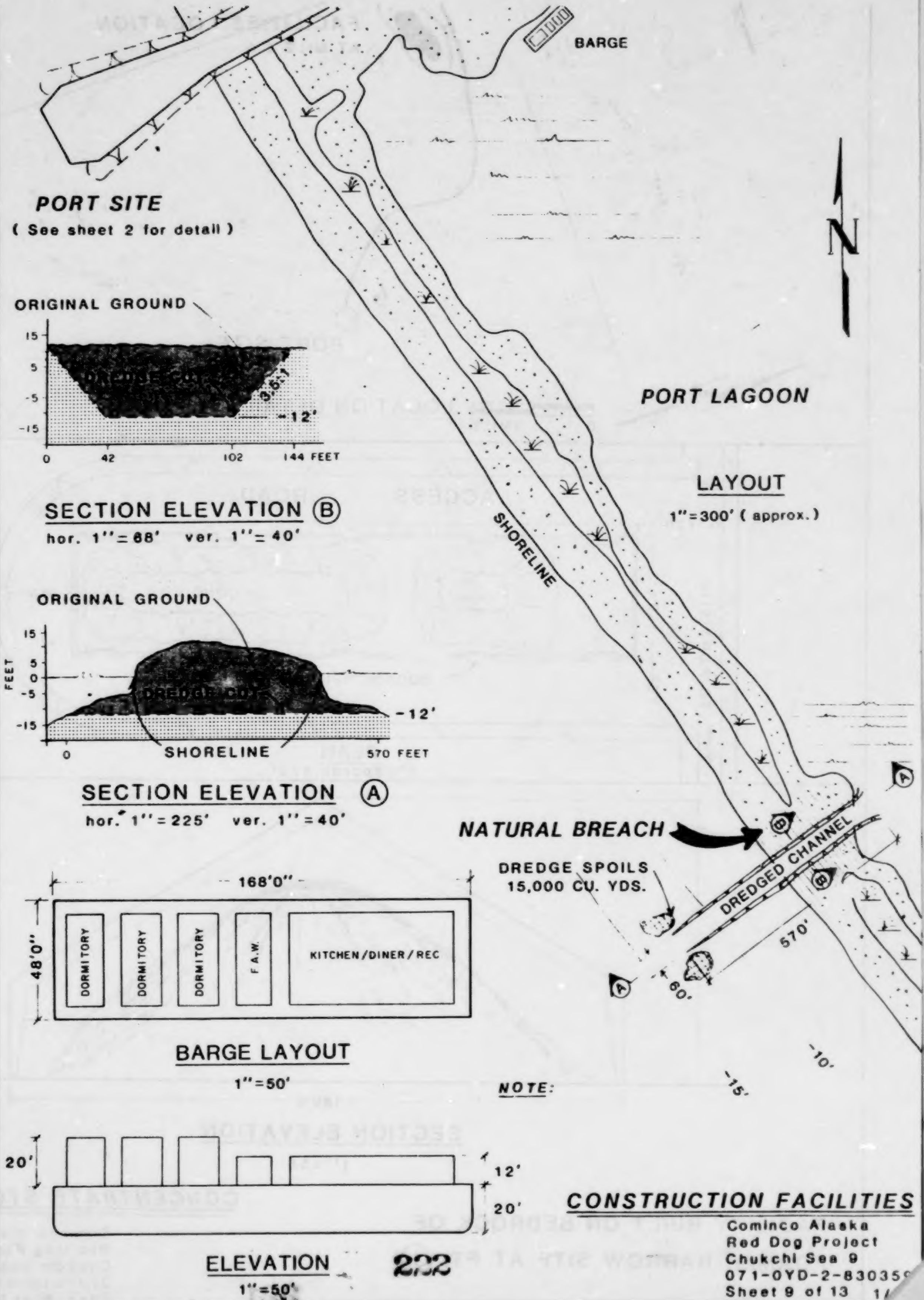
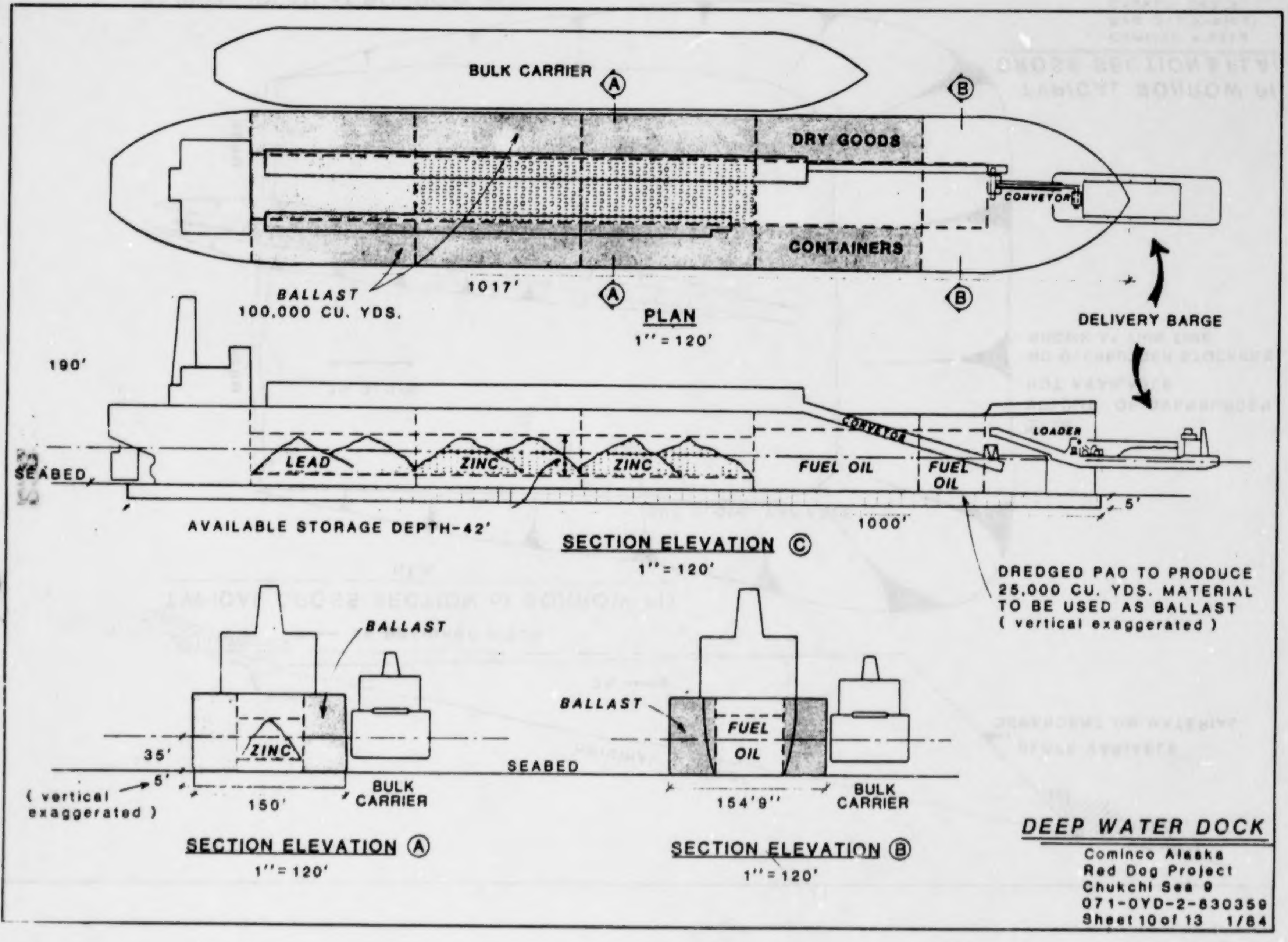

BARGE
PORT SITE
(See sheet 2 for detail)
PORT LAGOON
LAYOUT
1"=300' (approx.)
N
SHORELINE
NATURAL BREACH
DREDGE SPOILS
15,000 CU. YDS.
DREDGED CHANNEL
570'
60'
A
B
-10'
-15'
ORIGINAL GROUND
15
5
-5
-15
DREDGE CUT
3.5:1
-12'
0
42
102
144 FEET
SECTION ELEVATION B
hor. 1"=68' ver. 1"=40'
ORIGINAL GROUND
FEET
15
5
0
-5
-5
-15
DREDGE CUT
-12'
SHORELINE
0
570 FEET
SECTION ELEVATION A
hor. 1"=225' ver. 1"=40'
168'0"
48'0"
DORMITORY
DORMITORY
DORMITORY
F.A.W.
KITCHEN/DINER/REC
BARGE LAYOUT
1"=50'
NOTE:
20'
12'
20'
ELEVATION
1"=50'

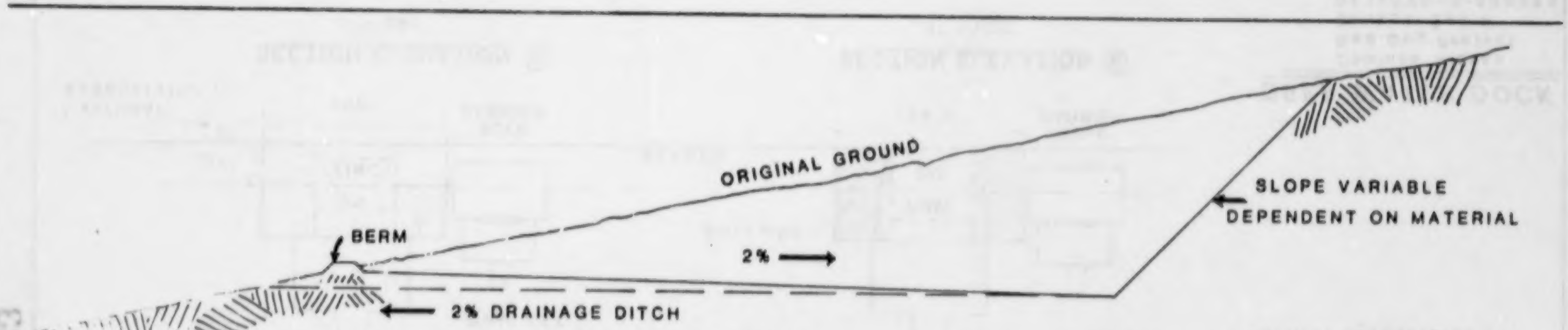
CONSTRUCTION FACILITIES

Cominco Alaska
Red Dog Project
Chukchi Sea 9
071-0YD-2-830359
Sheet 9 of 13 14


BULK CARRIER
Ⓐ
Ⓑ
DRY GOODS
CONVEYOR
CONTAINERS
BALLAST
100,000 CU. YDS.
1017'
Ⓐ
Ⓑ
PLAN
1'' = 120'
DELIVERY BARGE
190'
CONVEYOR
LOADER
LEAD
ZINC
ZINC
FUEL OIL
FUEL OIL
SEABED
5'
AVAILABLE STORAGE DEPTH-42'
1000'
SECTION ELEVATION Ⓒ
1'' = 120'
DREDGED PAD TO PRODUCE 25,000 CU. YDS. MATERIAL TO BE USED AS BALLAST (vertical exaggerated)
BALLAST
ZINC
35'
5'
(vertical exaggerated)
150'
BULK CARRIER
SECTION ELEVATION Ⓐ
1'' = 120'
BALLAST
FUEL OIL
SEABED
154'9''
BULK CARRIER
SECTION ELEVATION Ⓑ
1'' = 120'

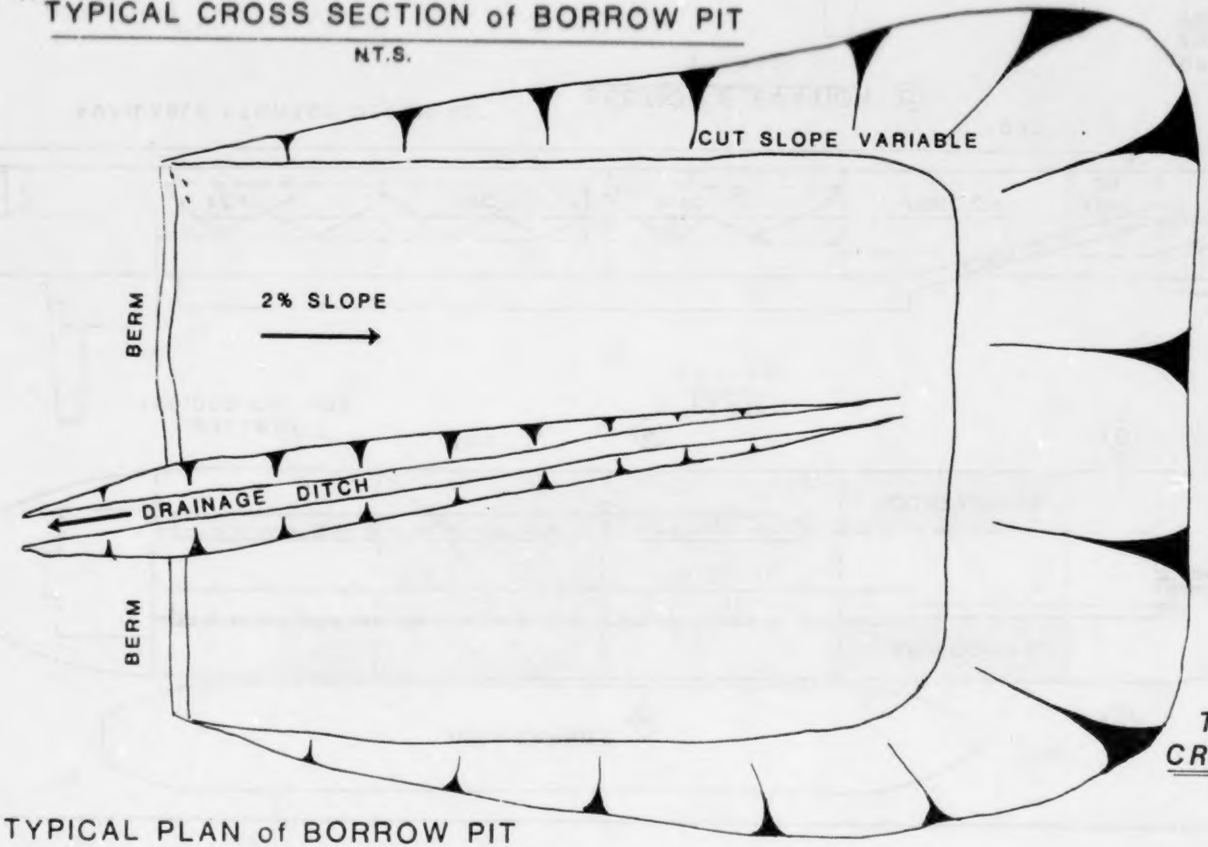
DEEP WATER DOCK

Cominco Alaska
Red Dog Project
Chukchi Sea 9
071-OYD-2-830359
Sheet 10 of 13 1/84


ORIGINAL GROUND
SLOPE VARIABLE
DEPENDENT ON MATERIAL
BERM
2% →
← 2% DRAINAGE DITCH

TYPICAL CROSS SECTION of BORROW PIT

N.T.S.


CUT SLOPE VARIABLE
BERM
2% SLOPE →
DRAINAGE DITCH
BERM

TYPICAL PLAN of BORROW PIT

N.T.S.

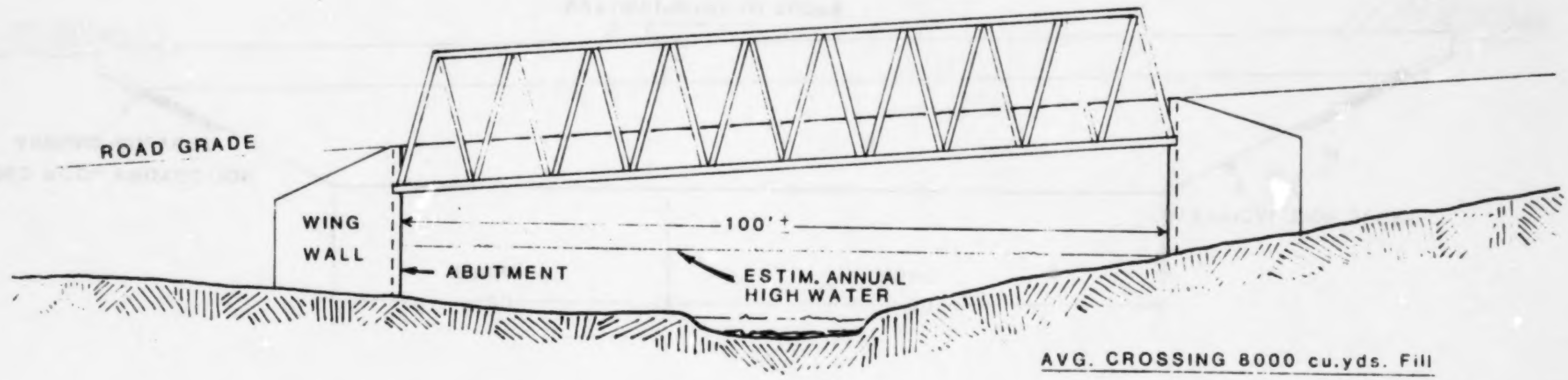
NOTE:

VOLUME OF OVERBURDEN NOT AVAILABLE

NO OVERBURDEN STOCKPILE SHOWN AT THIS TIME

TYPICAL BORROW PI
CROSS SECTION & PLAI

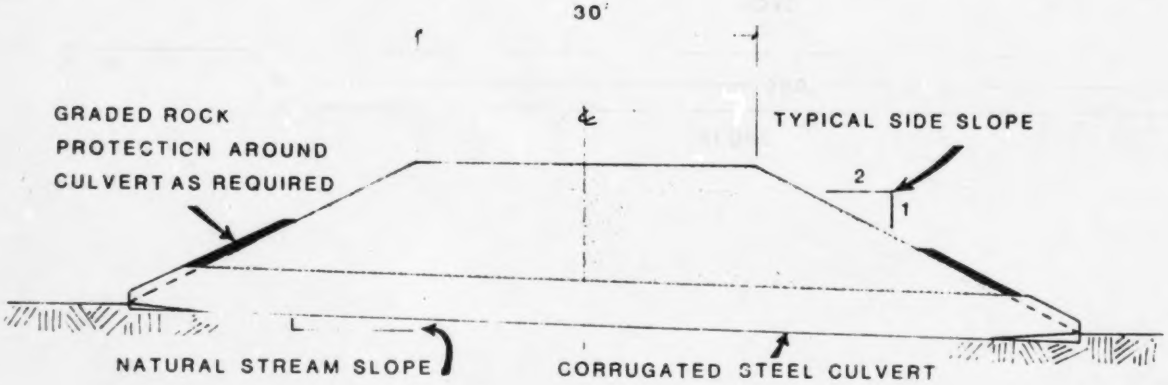
Cominco Alaska
Red Dog Project
Chukchi Sea 9
071-0YD-2-8303
Sheet 11 of 13 1/


ROAD GRADE
WING WALL
ABUTMENT
100'±
ESTIM. ANNUAL HIGH WATER

AVG. CROSSING 8000 cu.yds. Fill

TYPICAL BRIDGE CROSS SECTION

SCALE :HOR. 1"=20' VERT.1"=10'


30'
℄
TYPICAL SIDE SLOPE
2
1
GRADED ROCK PROTECTION AROUND CULVERT AS REQUIRED
NATURAL STREAM SLOPE
CORRUGATED STEEL CULVERT

TYPICAL ROAD CROSS SECTION SHOWING TYPICAL CULVERT

0 15'

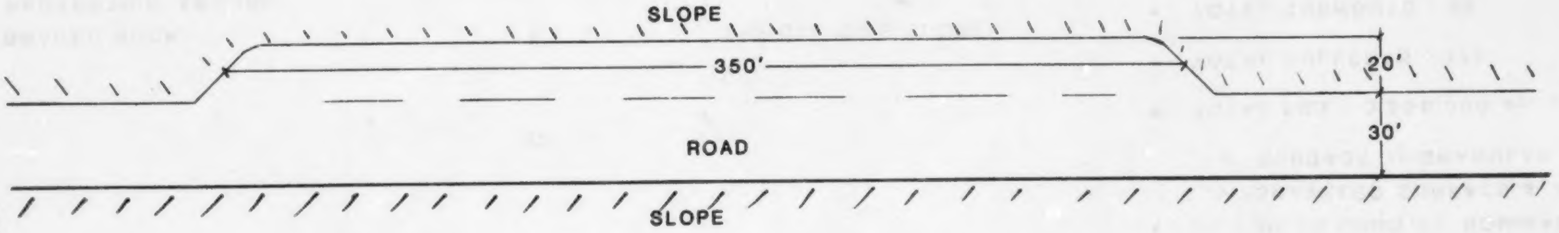
AVG. 1500 cu. yds. of fill

EXPLANATION of ROAD

- 56.7 MILES LONG,30' NOMINAL WIDT W/GRAVELED SURFACE & AVG. 6' SUBBASE of GRANULAR FIL
- TOTAL FILL : 3,866,000 cu. yds.
- TOTAL CULVERTS : 175
- TOTAL TURNOUTS : 28
  - 4000 cu. yds. FILL
  - DIM. 50' WIDE X 350' LONG PER TURNOUT
- MAJOR BRIDGES : ONE
- CROSSING of RIVERS & STREAMS :
  - OMIKVIOROK RIVER

BRIDGE&ROAD CROSS SECTIONS

Cominco Alaska
Red Dog Project
Chukchi Sea 9
071-0YD-2-83035
Sheet 12 of 13 1/8

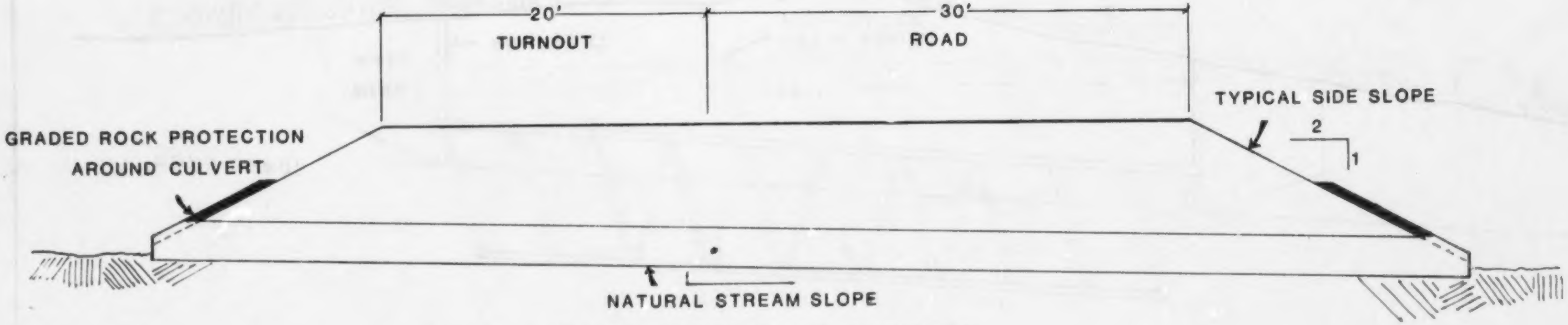

SLOPE
350'
20'
30'
ROAD
SLOPE

TYPICAL PLAN OF TURNOUT

SCALE 1" 60'

NOTE:

REFER TO SHEET 2 of 13


20'
TURNOUT
30'
ROAD
TYPICAL SIDE SLOPE
2
1
GRADED ROCK PROTECTION
AROUND CULVERT
NATURAL STREAM SLOPE

TYPICAL CROSS SECTION OF TURNOUT

N.T.S.

TYPICAL TURNOUT
CROSS SECTION & PLAN

Cominco Alaska
Red Dog Project
Chukchi Sea 9
071-0YD-2-830359
Sheet 13 of 13 1/84

ATTACHMENT D

Environmental Protection Agency
NPDES Permit Application
(Port Site)

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FOR AGENCY USE

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
APPLICATION FOR PERMIT TO DISCHARGE WASTEWATER

STANDARD FORM C – MANUFACTURING AND COMMERCIAL

SECTION I. APPLICANT AND FACILITY DESCRIPTION

Unless otherwise specified on this form all items are to be completed. If an item is not applicable indicate "NA."

ADDITIONAL INSTRUCTIONS FOR SELECTED ITEMS APPEAR IN SEPARATE INSTRUCTION BOOKLET AS INDICATED. REFER TO BOOKLET BEFORE FILLING OUT THESE ITEMS.

Please Print or Type

1. Legal Name of Applicant (see instructions)	101	COMINCO ALASKA
2. Mailing Address of Applicant (see instructions) Number & Street	102a	5660 "B" STREET
City	102b	ANCHORAGE
State	102c	ALASKA
Zip Code	102d	99502
3. Applicant's Authorized Agent (see instructions) Name and Title	103a	H. M. GIEGERICH PRESIDENT, COMINCO ALASKA
Number & Street Address	103b	5660 "B" STREET
City	103c	ANCHORAGE
State	103d	ALASKA
Zip Code	103e	99502
Telephone	103f	907 563-3686 Area Code Number
4. Previous Application If a previous application for a National or Federal discharge permit has been made, give the date of application. Use numeric designation for date.	104	___ ___ ___ YR MO DAY

I certify that I am familiar with the information contained in this application and that to the best of my knowledge and belief such information is true, complete, and accurate.

H. M. GIEGERICH
Printed Name of Person Signing

102e PRESIDENT
Title

Giegerich
Signature of Applicant or Authorized Agent

102f ___ ___ ___
YR MO DAY
Date Application Signed

18 U.S.C. Section 1001 provides that:

Whoever, in any matter within the jurisdiction of any department or agency of the United States knowingly and wilfully falsifies, conceals or covers up by any trick, scheme, or device a material fact, or makes any false, fictitious or fraudulent statement or representation, or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statement or entry, shall be fined not more than $10,000 or imprisoned not more than five years, or both.

FOR AGENCY USE

OFFICE: ___EPA Region [illegible]

___State

Received ___ ___ ___
YR MO DAY

This section contains 3 pages.

[illegible]

FOR AGENCY USE

[illegible] 105a ____________

Ownership (Public, Private or Both Public and Private) 105b ☐PUB ☐PRV ☐BPP

Check block if Federal Facility and give GSA Inventory Control Number 105c ☐FED

105d ____________

Location

Street & Number 105e ____________

City 105f ____________

County 105g ____________

State 105h ____________

6. **Nature of Business** State the nature of the business conducted at the plant or operating facility. 106a CONCENTRATE SHIPMENT

106b AGENCY USE

7. **Facility Intake Water** (see instructions) Indicate water intake volume per day by sources. Estimate average volume per day in thousand gallons per day.

Municipal or private water system 107a ____________ thousand gallons per day

Surface water 107b 2.0 thousand gallons per day

Groundwater 107c ____________ thousand gallons per day

Other* 107d ____________ thousand gallons per day

Total item 7 107e ____________ thousand gallons per day

*If there is intake water from "other," specify the source. 107f ____________

8. **Facility Water Use** Estimate average volume per day in thousand gallons per day for the following types of water usage at the facility. (see instructions)

Noncontact cooling water 108a ____________ thousand gallons per day

Boiler feed water 108b ____________ thousand gallons per day

Process water (including contact cooling water) 108c ____________ thousand gallons per day

Sanitary water 108d 20 thousand gallons per day

Other* 108e ____________ thousand gallons per day

Total item 8 108f ____________ thousand gallons per day

*If there are discharges to "other," specify. 108g ____________

If there is "Sanitary" water use, give the number of people served. 108h 20 max. [illegible]

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FOR AGENCY USE

☐☐☐☐☐☐☐☐

[illegible] Facility Discharges [illegible] Letter, Number and Discharge [illegible] and Volume [illegible] number of discharges [illegible] volume of water discharged [illegible] from the facility according to the categories below. [illegible] average volume per day [illegible] thousand gallons per day.

		Number of Discharge Points		Total Volume Used or Discharged, Thousand Gal/Day
Surface Water	109a1		109a2	
Sanitary wastewater transport system	109b1	1	109b2	2.0
Storm water transport system	109c1		109c2	
Combined sanitary and storm water transport system	109d1		109d2	
Surface impoundment with no effluent	109e1		109e2	
Underground percolation	109f1		109f2	
Well injection	109g1		109g2	
Waste acceptance firm	109h1		109h2	
Evaporation	109i1		109i2	
Consumption	109j1		109j2	
Other*	109k1		109k2	
Facility discharges and volume Total item 9.	109l1	1	109l2	2.0

*If there are discharges to "other," specify. 109m1

401

10. **Permits, Licenses and Applications**
List all existing, pending or denied permits, licenses and applications related to discharges from this facility (see instructions).

	Issuing Agency	For Agency Use	Type of Permit or License	ID Number	Date Filed YR/MO/DA	Date Issued YR/MO/DA	Date Denied YR/MO/DA	Expiration Date YR/MO/DA
110	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
1.								
2.								
3.								

11. **Maps and Drawings**
Attach all required maps and drawings to the back of this application. (see instructions)

12. **Additional Information**

112 Item Number	Information

FORM APPROVED
OMB No. 158–R0100

STANDARD FORM C – MANUFACTURING AND COMMERCIAL

FOR AGENCY USE
☐☐☐☐☐☐☐☐☐

SECTION II. BASIC DISCHARGE DESCRIPTION

Complete this section for each discharge indicated in Section I, Item 9, that is to surface waters. This includes discharges to municipal sewerage systems in which the wastewater does not go through a treatment works prior to being discharged to surface waters. Discharges to wells must be described where there are also discharges to surface waters from this facility. SEPARATE DESCRIPTIONS OF EACH DISCHARGE ARE REQUIRED EVEN IF SEVERAL DISCHARGES ORIGINATE IN THE SAME FACILITY. All values for an existing discharge should be representative of the twelve previous months of operation. If this is a proposed discharge, values should reflect best engineering estimates.

ADDITIONAL INSTRUCTIONS FOR SELECTED ITEMS APPEAR IN SEPARATE INSTRUCTION BOOKLET AS INDICATED. REFER TO BOOKLET BEFORE FILLING OUT THESE ITEMS.

1. Discharge Serial No. and Name		
a. Discharge Serial No. (see instructions)	201a	001
b. Discharge Name Give name of discharge, if any. (see instructions)	201b	DOMESTIC WASTEWATER TREATMENT
c. Previous Discharge Serial No. If previous permit application was made for this discharge (see Item 4, Section I), provide previous discharge serial number.	201c	
2. Discharge Operating Dates		
a. Discharge Began Date If the discharge described below is in operation, give the date (within best estimate) the discharge began.	202a	88 YR 6 MO
b. Discharge to Begin Date If the discharge has never occurred but is planned for some future date, give the date (within best estimate) the discharge will begin.	202b	___ YR ___ MO
c. Discharge to End Date If discharge is scheduled to be discontinued within the next 5 years, give the date (within best estimate) the discharge will end.	202c	___ YR ___ MO
3. Engineering Report Available Check if an engineering report is available to reviewing agency upon request. (see instructions)	203	☐
4. Discharge Location Name the political boundaries within which the point of discharge is located.		

				Agency Use
State	204a	Alaska	204d	
County	204b	NANA region	204e	
(if applicable) City or Town	204c		204f	

5. Discharge Point Description
Discharge is into (check one): (see instructions)

Stream (includes ditches, arroyos, and other intermittent watercourses)	205a	☐ STR
Lake		☐ LKE
Ocean		☒ OCE
Municipal Sanitary Wastewater Transport System		☐ MTS
Municipal Combined Sanitary and Storm Transport System		☐ MCS

This section contains 9 pages.

DISCHARGE SERIAL NUMBER

______

FOR AGENCY USE

Municipal Storm Water Transport System ☐ STS

Well (Injection) ☐ WEL

Other ☐ OTH

If 'other' is checked, specify **205b** ______

6. **Discharge Point — Lat/Long** Give the precise location of the point of discharge to the nearest second.

Latitude **206a** 67 DEG 38 MIN ____ SEC

Longitude **206b** 164 DEG 14 MIN ____ SEC

7. **Discharge Receiving Water Name** Name the waterway at the point of discharge.(see instructions) **207a** ______

If the discharge is through an outfall that extends beyond the shoreline or is below the mean low water line, complete Item 8.

207b

For Agency Use		
Major	Minor	Sub

207c

For Agency Use
303e

8. **Offshore Discharge**

a. Discharge Distance from Shore **208a** 500 feet

b. Discharge Depth Below Water Surface **208b** 14 feet

9. **Discharge Type and Occurrence**

a. Type of Discharge Check whether the discharge is continuous or intermittent. (see instructions) **209a**

☒ (con) Continuous

☐ (int) Intermittent

b. Discharge Occurrence Days per Week Enter the average number of days per week (during periods of discharge) this discharge occurs. **209b** 7 days per week

c. Discharge Occurrence —Months If this discharge normally operates (either intermittently, or continuously) on less than a year-around basis (excluding shutdowns for routine maintenance), check the months during the year when the discharge is operating. (see instructions) **209c**

☐ JAN ☐ FEB ☐ MAR ☐ APR

☐ MAY ☒ JUN ☒ JUL ☒ AUG

☒ SEP ☒ OCT ☒ NOV ☐ DEC

Complete Items 10 and 11 if "intermittent" is checked in Item 9.a. Otherwise, proceed to Item 12.

10. **Intermittent Discharge Quantity** State the average volume per discharge occurrence in thousands of gallons. **210** ______ thousand gallons per discharge occurrence.

11. **Intermittent Discharge Duration and Frequency**

a. Intermittent Discharge Duration Per Day State the average number of hours per day the discharge is operating. **211a** ____ hours per day

b. Intermittent Discharge Frequency State the average number of discharge occurrences per day during days when discharging. **211b** ____ discharge occurrences per day

12. **Maximum Flow Period** Give the time period in which the maximum flow of this discharge occurs. **212** From July (month) to Oct (month)

DISCHARGE SERIAL NUMBER

____

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FOR AGENCY USE

13. Activity Description Give a narrative description of activity producing this discharge.(see instructions)

213a UP TO 20 PEOPLE (NORMALLY 14) WILL BE ACCOMMODATED AT THE PORT SITE DURING THE SHIPPING SEASON. DOMESTIC WASTEWATER WILL BE GENERATED IN THE KITCHEN, SHOWER, & SANITARY FACILITIES WHICH WILL BE A PART OF THE CAMP ACCOMMODATIONS. THESE WASTEWATERS WILL BE COMBINED & TREATED PRIOR TO DISCHARGE.

14. Activity Causing Discharge For each SIC Code which describes the activity causing this discharge, supply the type and maximum amount of either the raw material consumed (item 14a) or the product produced (item 14b) in the units specified in Table I of the Instruction Booklet. For SIC Codes not listed in Table I, use raw material or production units normally used for measuring production.(see instructions)

a. Raw Materials

	SIC Code (1)	Name (2)	Maximum Amount/Day (3)	Unit (See Table I) (4)	Shared Discharges (Serial Number) (5)
214a					

b. Products

	SIC Code (1)	Name (2)	Maximum Amount/Day (3)	Unit (See Table I) (4)	Shared Discharges (Serial Number) (5)
214b					

SCS

233

DISCHARGE SERIAL NUMBER

____

FOR AGENCY USE

15. Waste Abatement

a. Waste Abatement Practices
Describe the waste abatement practices used on this discharge with a brief narrative. (see instructions)

215a Narrative: WASTEWATER WILL BE COLLECTED IN A COMMON SURGE TANK AND TREATED BY EXTENDED AERATION. THE SOLIDS WILL BE SETTLED IN A CLARIFIER & AEROBICALLY DIGESTED PRIOR TO DISPOSAL. THE CLARIFIER OVERFLOW WILL BE DISINFECTED AND DISCHARGED TO THE SEA.

b. Waste Abatement Codes
Using the codes listed in Table II of the Instruction Booklet, describe the waste abatement processes for this discharge in the order in which they occur if possible.

215b
(1) PEQUAL. (2) PAERAT. (3) BACTIV.
(4) PSEDIM. (5) CCLDIS. (6) SAEROB.
(7) ______. (8) ______. (9) ______.
(10) ______. (11) ______. (12) ______.
(13) ______. (14) ______. (15) ______.
(16) ______. (17) ______. (18) ______.
(19) ______. (20) ______. (21) ______.
(22) ______. (23) ______. (24) ______.
(25) ______.

DISCHARGE SERIAL NUMBER

____

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FOR AGENCY USE

16. Wastewater Characteristics

Check the box beside each constituent which is present in the effluent (discharge water). This determination is to be based on actual analysis or best estimate.(see instructions)

Parameter 216	Present	Parameter 216	Present
Color 00080		Copper 01042	
Ammonia 00610	X	Iron 01045	
Organic nitrogen 00605		Lead 01051	
Nitrate 00620	X	Magnesium 00927	
Nitrite 00615	X	Manganese 01055	
Phosphorus 00665	X	Mercury 71900	
Sulfate 00945		Molybdenum 01062	
Sulfide 00745		Nickel 01067	
Sulfite 00740		Selenium 01147	
Bromide 71870		Silver 01077	
Chloride 00940		Potassium 00937	
Cyanide 00720		Sodium 00929	
Fluoride 00951		Thallium 01059	
Aluminum 01105		Titanium 01152	
Antimony 01097		Tin 01102	
Arsenic 01002		Zinc 01092	
Beryllium 01012		Algicides* 74051	
Barium 01007		Chlorinated organic compounds* 74052	
Boron 01022		Pesticides* 74053	
Cadmium 01027		Oil and grease 00550	X
Calcium 00916		Phenols 32730	
Cobalt 01037		Surfactants 38260	
Chromium 01034		Chlorine 50060	X
Fecal coliform bacteria 74055	X	Radioactivity* 74050	

*Specify substances, compounds and/or elements in Item 26.

Pesticides (insecticides, fungicides, and rodenticides) must be reported in terms of the acceptable common names specified in *Acceptable Common Names and Chemical Names for the Ingredient Statement on Pesticide Labels*, 2nd Edition, Environmental Protection Agency, Washington, D.C. 20250, June 1972, as required by Subsection 162.7(b) of the Regulations for the Enforcement of the Federal Insecticide, Fungicide, and Rodenticide Act.

DISCHARGE SERIAL NUMBER

FOR AGENCY USE

17. Description of Intake and Discharge

For each of the parameters listed below, enter in the appropriate box the value or code letter answer called for.(see instructions)

In addition, enter the parameter name and code and all required values for any of the following parameters if they were checked in Item 16; ammonia, cyanide, aluminum, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, zinc, phenols, oil and grease, and chlorine (residual).

Parameter and Code 217a	Influent		Effluent					
	Untreated Intake Water (Daily Average) (1)	In-Plant Treated Intake Water (Daily Average) (2)	Daily Average (3)	Minimum Value Observed or Expected During Discharge Activity (4)	Maximum Value Observed or Expected During Discharge Activity (5)	Frequency of Analysis (6)	Number of Analyses (7)	Sample Type (8)
Flow* Gallons per day 00056	2,250	1,500	1,500	500	2,000			
pH Units 00400	8.2	7.0		6.5	7.5			
Temperature (winter) °F 74028	34	55	70	60	75			
Temperature (summer) °F 74027	42	60	80	70	85			
Biochemical Oxygen Demand (BOD 5-day) mg/l 00310	NA	Nil	30	10	50			
Chemical Oxygen Demand (COD) mg/l 00340	NA	NA	NA	NA	NA			
Total Suspended (nonfilterable) Solids mg/l 00530	NA	NA	20	10	45			
Specific Conductance micromhos/cm at 25° C 00095	NA	NA		NA	NA			
Settleable Matter (residue) ml/l 00545	NA	NA	0.5	0.2	0.75			

*Other discharges sharing intake flow (serial numbers).(see instructions)

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DISCHARGE SERIAL NUMBER

FOR AGENCY USE

17. (Cont'd.)

Parameter and Code 217a	Influent		Effluent					
	Untreated Intake Water (Daily Average) (1)	In-Plant Treated Intake Water (Daily Average) (2)	Daily Average (3)	Minimum Value Observed or Expected During Discharge Activity (4)	Maximum Value Observed or Expected During Discharge Activity (5)	Frequency of Analysis (6)	Number of Analyses (7)	Sample Type (8)
Ammonia 00610	NA	NA	5.0	3.0	10.0			
Oil & Grease 00550	NA	NA	LT 5.0	LT 5.0	5.0			
Chlorine 50060	NA	NA	2.0	1.0	3.0			

18. Plant Controls Check if the following plant controls are available for this discharge. 218

Alternate power source for major pumping facility. ☐ APS

Alarm or emergency procedure for power or equipment failure ☐ ALM

Complete item 19 if discharge is from cooling and/or steam water generation and water treatment additives are used.

19. Water Treatment Additives If the discharge is treated with any conditioner, inhibitor, or algicide, answer the following:

a. Name of Material(s) 219a

b. Name and address of manufacturer 219b

c. Quantity (pounds added per million gallons of water treated). 219c

237

DISCHARGE SERIAL NUMBER

____

FOR AGENCY USE

d. Chemical composition of these additives (see instructions). | 219d | __________

Complete items 20-25 if there is a thermal discharge (e.g., associated with a steam and/or power generation plant, steel mill, petroleum refinery, or any other manufacturing process) and the total discharge flow is 10 million gallons per day or more. (see instructions)

20. Thermal Discharge Source Check the appropriate item(s) indicating the source of the discharge. (see instructions) | 220

Boiler Blowdown	☐ BLBD
Boiler Chemical Cleaning	☐ BCCL
Ash Pond Overflow	☐ APOF
Boiler Water Treatment — Evaporator Blowdown	☐ EPBD
Oil or Coal Fired Plants — Effluent from Air Pollution Control Devices	☐ OCFP
Condense Cooling Water	☐ COND
Cooling Tower Blowdown	☐ CTBD
Manufacturing Process	☐ MFPR
Other	☐ OTHR

21. Discharge/Receiving Water Temperature Difference

Give the maximum temperature difference between the discharge and receiving waters for summer and winter operating conditions. (see instructions)

Summer | 221a | ______ °F.

Winter | 221b | ______ °F.

22. Discharge Temperature, Rate of Change Per Hour | 222 | ______ °F./hour

Give the maximum possible rate of temperature change per hour of discharge under operating conditions. (see instructions)

23. Water Temperature, Percentile Report (Frequency of Occurrence)

In the table below, enter the temperature which is exceeded 10% of the year, 5% of the year, 1% of the year and not at all (maximum yearly temperature). (see instructions)

Frequency of occurrence		10%	5%	1%	Maximum
a. Intake Water Temperature (Subject to natural changes)	223a	°F	°F	°F	°F
b. Discharge Water Temperature	223b	°F	°F	°F	°F

24. Water Intake Velocity (see instructions) | 224 | ______ feet/sec.

25. Retention Time Give the length of time, in minutes, from start of water temperature rise to discharge of cooling water. (see instructions) | 225 | ______ minutes

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DISCHARGE SERIAL NUMBER

FOR AGENCY USE

26. Additional Information

226

Item	Information

ATTACHMENT E

An Economic Evaluation of Alternative Road Routes from RED DOG to a Road/Marine Transhipment Site

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I. INTRODUCTION 1

- Purpose and Outline of Report

II. DESCRIPTION OF PROPOSED ROAD ALTERNATIVES 2

- Identification of Alternatives Considered
- Description of Selection Procedure
- Derivation and Definition of Design Parameters
- Discussion of Engineering Constraints

III. COST ESTIMATES 18

- Basis of Estimate
- Audit
- Estimate for Asikpak Route
- Estimate for Kruz Route Using Borrow Sources Inside the National Monument
- Estimate for Kruz Route Using Borrow Obtained Outside the National Monument

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3 °	Hunting and Trapping Constraints	6
4 °	Fish and Game Constraints	7
5 °	EIS Selected Route Options	9
6 °	Design Vehicle (Concentrate Truck) and Module Transporter	11
7 °	Road Cross Sections	13
8 °	Proposed Borrow Pit Locations	14
9 °	Typical Bridge Details	16
10 °	Typical Culvert Details	17

I. INTRODUCTION

The purpose of this report is to provide route selection and engineering data sufficient to permit a detailed independent review.

The report outlines the cost of constructing and operating a road from Red Dog to a port on the Chukchi Sea. The alternative routes investigated are identified and the selection procedure described. In addition, the report defines the environmental constraints, basic engineering design parameters and basis of estimate.

Throughout this report geographical identification is based on physical features and settlements named on the U.S. Geological Survey 1:63360 scale mapping.

II. DESCRIPTION OF PROPOSED ROAD ALTERNATIVES

The Red Dog deposit is located in northwest Alaska approximately 90 miles north of Kotzebue and 70 miles east of Kivalina. The deposit is on the west side of Deadlock Mountain and straddling Red Dog Creek. A suitable mill site has been identified on a low hill 1-1/2 miles west of the deposit at an elevation of 1050 feet. This is the designated inland terminus for all the alternative road routes investigated.

Four possible port sites on the Chukchi Sea have been identified, together with two road vehicle to barge transshipment sites on the Noatak River. These are located as follows (see Figure 1):

- Port Site 1 -- 28 miles northwest of Kivalina village, between Singoalik and Pusigrak lagoons.
- Port Site 2 -- 16 miles northwest of Kivalina village and immediately south of Tugak lagoon.
- Port Site 3 -- Located 10 miles southeast of Kivalina village at VABM 17, between Imikruk and Ipiavik lagoons.
- Port Site 4 -- Located 16 miles southeast of Kivalina village at VABM 28, midway between the mouths of New Heart and Umagatsiak Creeks.
- Transshipment Site 1 -- On the Noatak River at Noatak village.
- Transshipment Site 2 -- At the Fish hatchery on the Noatak River, 19 miles south of Noatak village and 10 miles above the confluence of the Agashashok River.

II. DESCRIPTION OF PROPOSED ROAD ALTERNATIVES (continued)

Engineering and environmental constraint maps were prepared incorporating existing data and the results of field work carried out by Cominco's consultants. (For much simplified versions of these maps, see Figures 2, 3, and 4). Using these maps along with U.S. Geological Survey 1:63360 scale mapping numerous possible routes and route segments were defined (see Figure 1).

For each of these routes, the alignment has been plotted on 1:63360 scale mapping or enlargement of this mapping and for the majority of routes profiles were also prepared.

A preliminary engineering evaluation was carried out for each route. This evaluation included an estimation of route length, determination of terrain characteristics by segment, calculation of approximate fill quantities, preliminary sizing of major bridges and an estimation of minor bridge and culvert requirements. From this data, preliminary cost estimates were prepared. A preliminary selection was made using these cost estimates in conjunction with the constraint mapping and additional field reconnaisance.

All of these routes were reviewed by the Environmental Protection Agency and the Department of the Interior. The KRUZ and ASIKPAK route options were selected by these agencies for more detailed study (Figure 5). The Environmental Impact Statement should be referred to for a detailed description of this selection procedure. In addition, further studies were carried out by Cominco and the Environmental Protection Agency's E.I.S. contractor of the logistics and costs of the road/barge/bulk carrier transshipment via the Noatak River.

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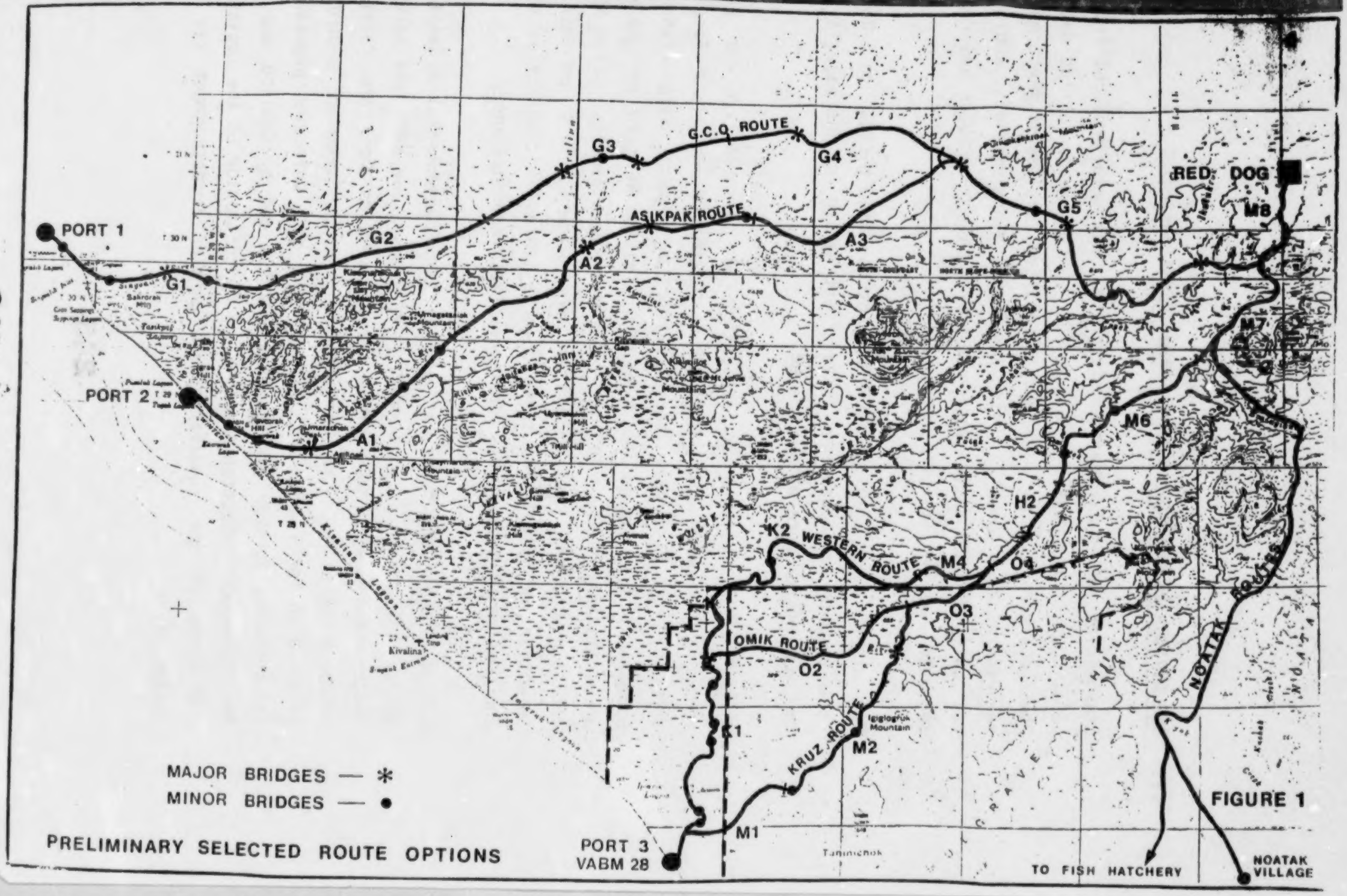
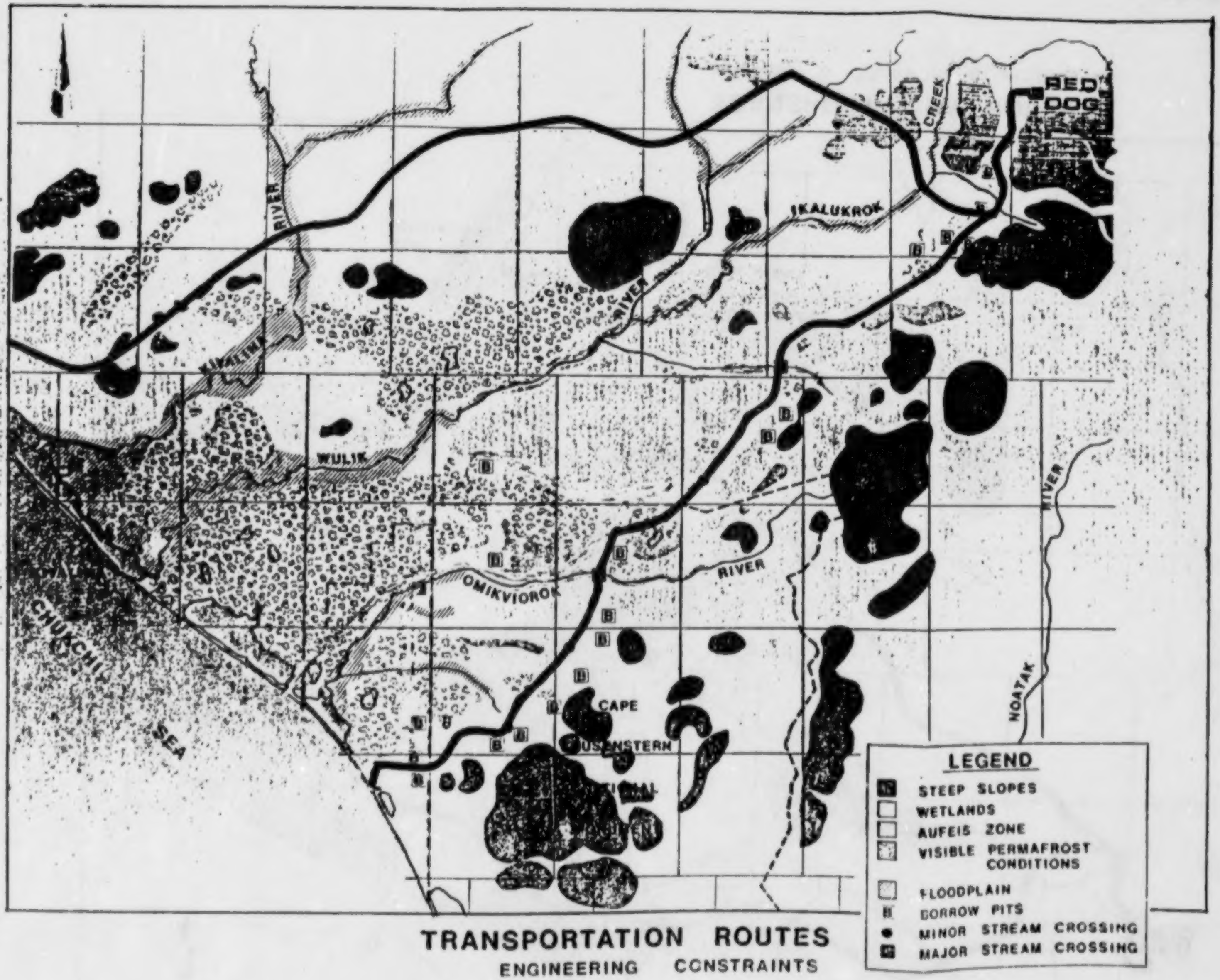

PORT 1
PORT 2
PORT 3
VABM 28
RED DOG
G.C.O. ROUTE
ASIKPAK ROUTE
WESTERN ROUTE
OMIK ROUTE
KRUZ ROUTE
NOATAK ROUTES
G1
G2
G3
G4
G5
A1
A2
A3
K1
K2
M1
M2
M4
M6
M7
M8
H2
O2
O3
O4
Kivalina Lagoon
Kivalina
Igichuk Mountain
TO FISH HATCHERY
NOATAK VILLAGE
MAJOR BRIDGES — *
MINOR BRIDGES — ●

FIGURE 1

PRELIMINARY SELECTED ROUTE OPTIONS


RED DOG
CREEK
IKALUKROK
RIVER
RIVER
WULIK
OMIKVIOROK
RIVER
CAPE
KRUSENSTERN
NOATAK
RIVER
CHUKCHI
SEA
LEGEND
STEEP SLOPES
WETLANDS
AUFEIS ZONE
VISIBLE PERMAFROST CONDITIONS
FLOODPLAIN
B BORROW PITS
● MINOR STREAM CROSSING
MAJOR STREAM CROSSING

TRANSPORTATION ROUTES
ENGINEERING CONSTRAINTS

FIGURE 2

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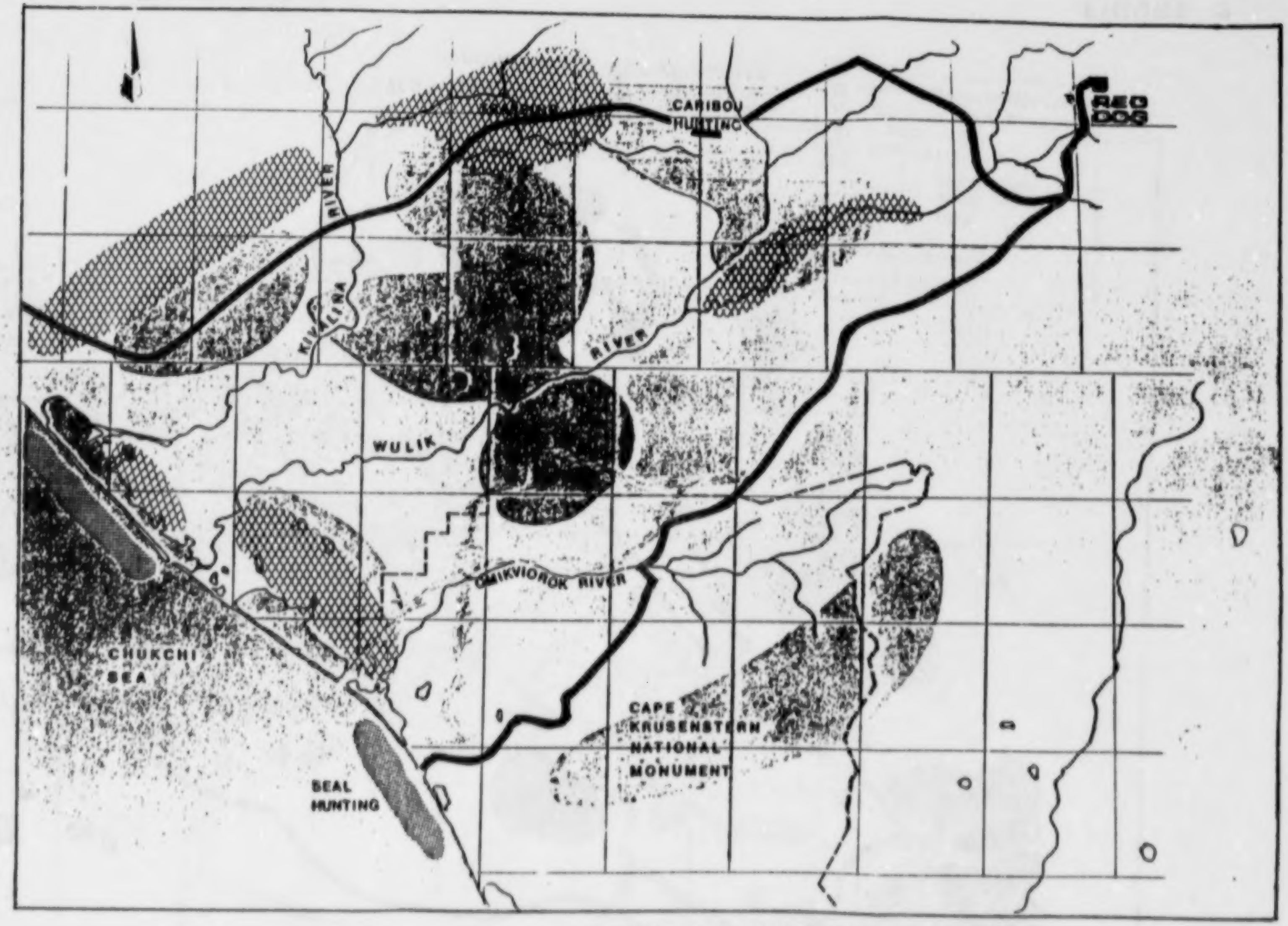
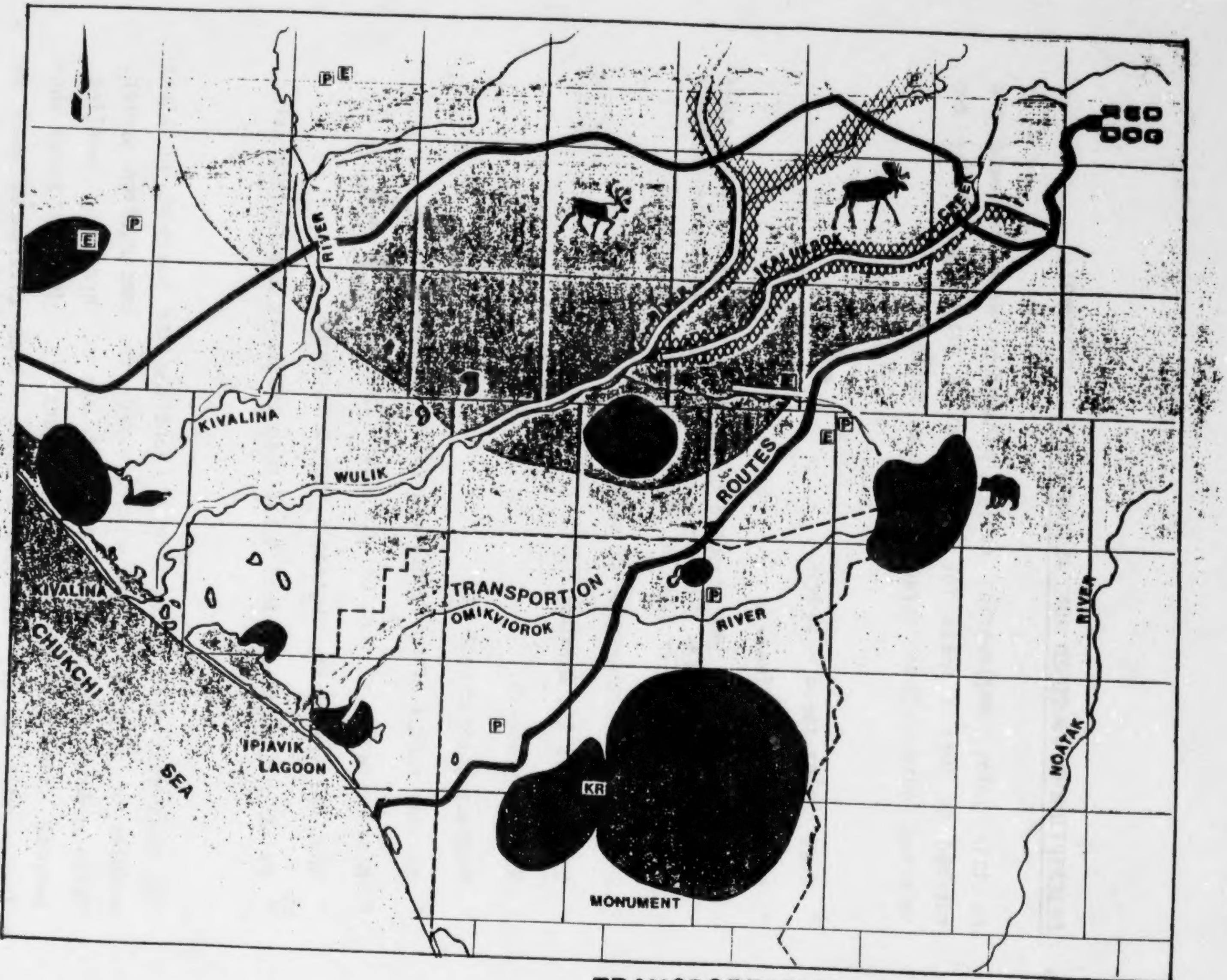

CARIBOU HUNTING
RED DOG
KIVALINA
RIVER
WULIK
RIVER
OMIKVIOROK RIVER
CHUKCHI SEA
CAPE KRUSENSTERN NATIONAL MONUMENT
SEAL HUNTING

TRANSPORTATION ROUTES
HUNTING & TRAPPING CONSTRAINTS

FIGURE 3


RED DOG
IKALUKROK CREEK
RIVER
KIVALINA
WULIK
ROUTES
TRANSPORTATION
OMIKVIOROK
RIVER
NOATAK
RIVER
KIVALINA
CHUKCHI
SEA
IPIAVIK
LAGOON
MONUMENT
KR
P
E

TRANSPORTATION ROUTES
FISH & GAME CONSTRAINTS

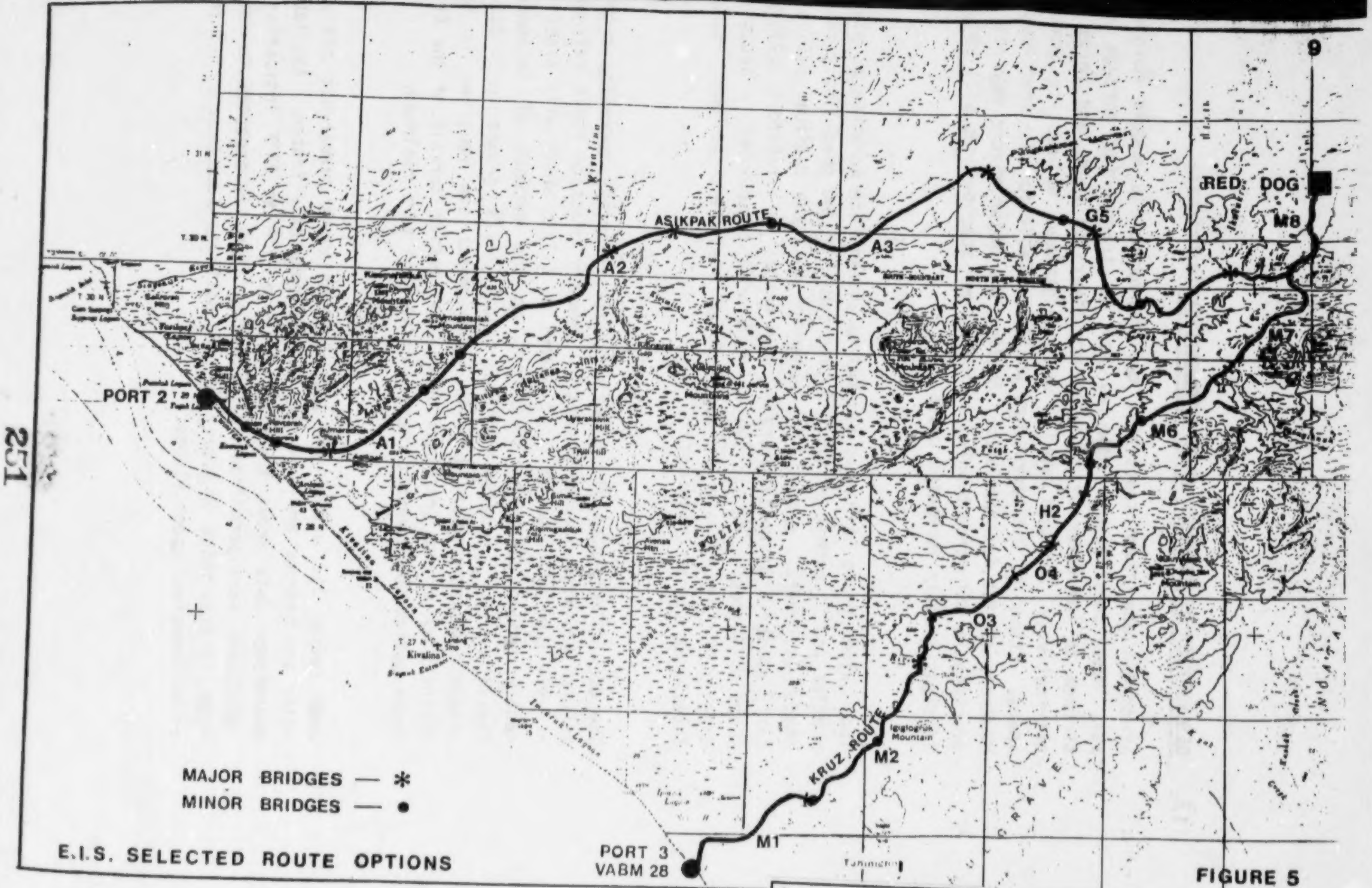
FIGURE 4

II. DESCRIPTION OF PROPOSED ROAD ALTERNATIVES (continued)

At this point, engineering design parameters were reviewed and refined to form a basis for more detailed evaluation of the two selected routes. These parameters are as follows:

- Road design speed - 30 mph.
- Road width - 30 feet.
- Design vehicle is the proposed concentrate haul truck/a tractor/ double trailer, side dump vehicle of 443,000 lbs GVW and maximum tandem axle loads of 109,500 lbs. (Figure 6).
- Crossfall 3% either side of center line.
- Side slopes 2:1 minimum.
- Maximum grade 4%.
- Maximum grade change 4%.
- Minimum radius of horizontal curvature 400 feet.
- Minimum radius of vertical curvature 1500 feet.
- Thaw settlement of subgrade 6 inches maximum.
- Passing turnouts (50 feet total road width) at 2 mile intervals.

The road must also be capable of handling the movement of plant modules of up to 1500 tons weight during the construction period. These modules will be moved on multi-wheeled, hydraulic levelled, purpose made transport vehicles (Figure 6). Maximum speed when loaded will be approximately 5 mph. Side clearances must be sufficient to permit movement of modules up to 70 feet wide.


9
RED DOG
M8
G5
A3
ASIKPAK ROUTE
A2
A1
PORT 2
M7
M6
H2
O4
O3
KRUZ ROUTE
M2
M1
PORT 3
VABM 28
MAJOR BRIDGES — *
MINOR BRIDGES — ●

E.I.S. SELECTED ROUTE OPTIONS

FIGURE 5

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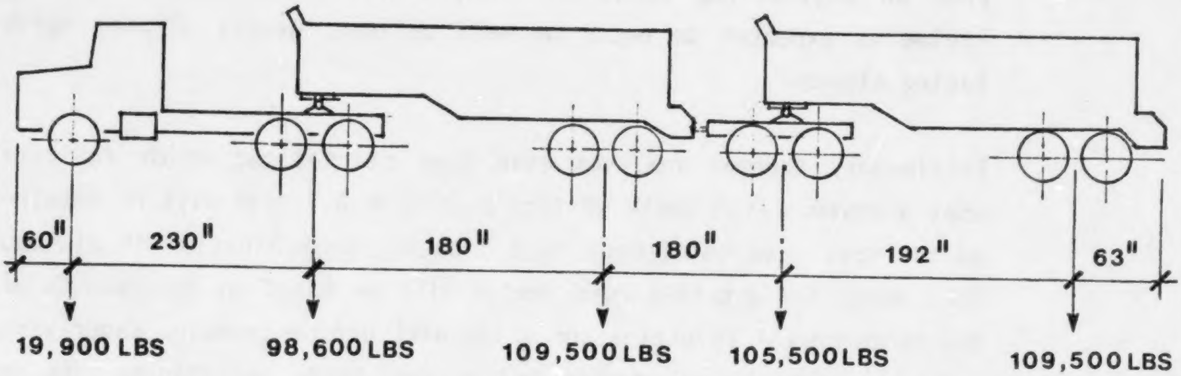
II. DESCRIPTION OF PROPOSED ROAD ALTERNATIVES (continued)

At stream and river crossings, two approaches to module movement have been considered. Modules may be transported through the streams at low water using temporary diversion roads and fords or alternatively, bridges would be strengthened to sustain module loads. Either of the approaches would be viable for the Kruz Route, however, on the Asikpak Route, fording the major rivers may not be practicable and strengthening of the longer span bridges will result in significantly increased costs.

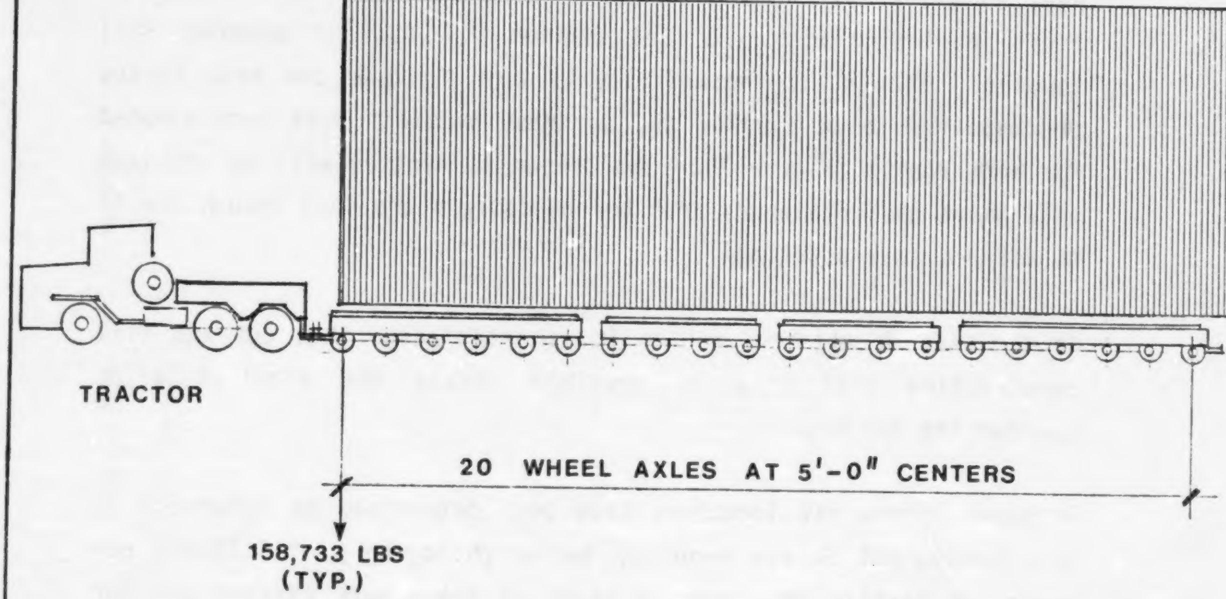
The maximum grade of 4% was adopted to accommodate movement of plant modules and to permit possible future reuse of the grade for a railroad. In general, grades will be easier than the maximum, particularly on the Kruz route where maximum grades only exceed 1-1/2% for short distances. The maximum 4% grade will be adopted in areas of more difficult terrain on the Asikpak route and on both routes locally at stream crossings.

The use of 4% grades for a railroad will generate operating difficulties and high operating costs. Industry practice for a railroad of this type would be to limit grades to 1-1/2% which will significantly reduce operating costs but at the expense of increased capital cost. Studies indicate that 1-1/2% grades will offer economic benefit where profile improvements are required in the vicinity of stream crossings only. The easier terrain of the Kruz route option would permit cheaper conversion to a railroad.

Both routes lie within the zone of continuous permafrost and all soils and bedrock are expected to be permanently frozen. Available thermistor data shows temperatures from 32°F to 27°F indicating a relatively warm permafrost. The active layer is expected to range from 1-2 feet thick on poorly drained soils to a maximum of 4-5 feet on well-drained upper slopes.


60"
230"
180"
180"
192"
63"
19,900 LBS
98,600 LBS
109,500 LBS
105,500 LBS
109,500 LBS

CONCENTRATE HAULER – 150 tons


TRACTOR
20 WHEEL AXLES AT 5'-0" CENTERS
158,733 LBS
(TYP.)

MODULE TRANSPORTER

FIGURE 6

II. DESCRIPTION OF PROPOSED ROAD ALTERNATIVES (continued)

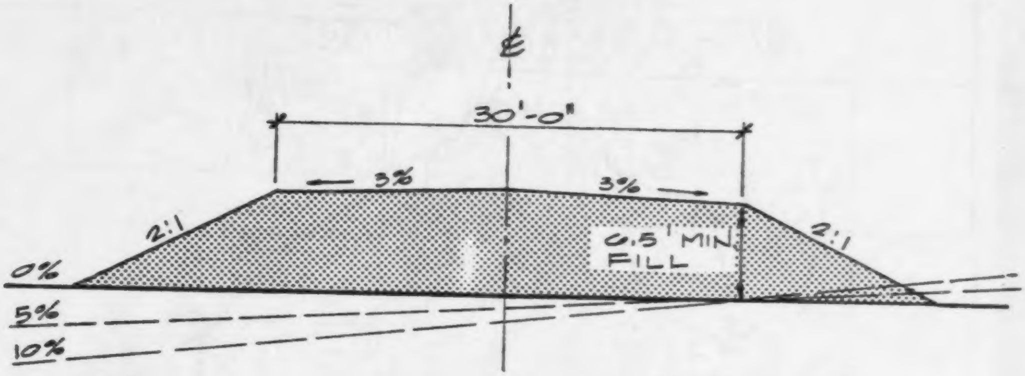
From an engineering point of view, the most acceptable thermal regime is expected to occur on well drained, gently sloping north facing slopes.

Preliminary thermal analyses have been carried out which indicate that a minimum fill depth of from 5 feet to 6.5 feet will be required to limit thaw settlement to 6 inches. Determination of minimum fill depth for detailed road design will be based on the results of the Geotechnical Investigation which will define terrain, underlying soils, ground thermal regime and micro-climate variations. It is anticipated that minimum fill depth will vary along the length of the road.

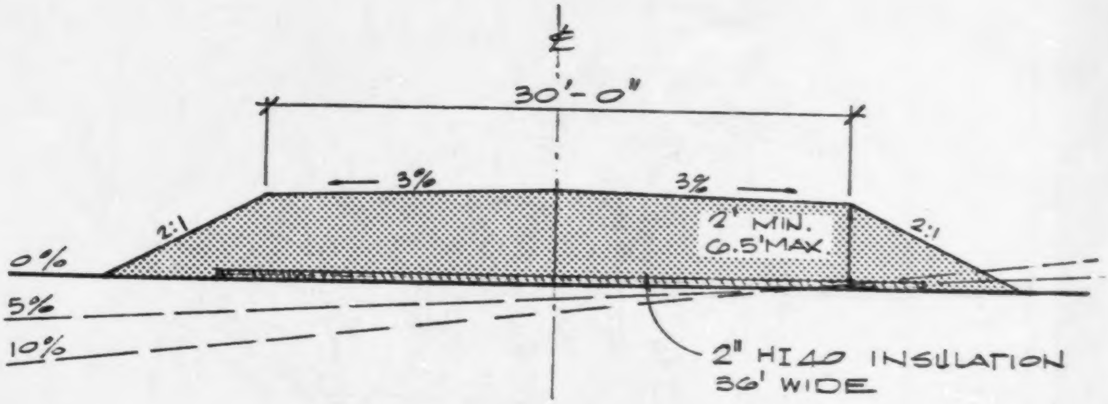
The estimates have been based on a minimum fill depth of 6.5 feet with an alternative composite construction comprising 2 inches of rigid insulation with a 2 feet minimum thickness of granular fill topping. Thermal characteristics of both Asikpak and Kruz routes are expected to be similar and so these sections have been adopted for both routes (Figure 7). The composite section will be utilized only where haul distances from borrow sources are long enough for it to offer a cost advantage.

On the Asikpak and Kruz routes it is anticipated that cut and fill construction will only be possible within the final 8 miles approaching Red Dog.

Proposed borrow pit locations have been determined by reference to U.S. Geological Survey mapping, aerial photography at 1:12000, reports and terrain unit mapping based on field work carried out for Cominco by Dames and Moore and supported by field reconnaissance (Figure 8).


℄
30'-0"
3%
3%
2:1
2:1
6.5' MIN.
FILL
0%
5%
10%

FILL CROSS SECTION


℄
30'-0"
3%
3%
2:1
2:1
2' MIN.
6.5' MAX.
0%
5%
10%
2" HI40 INSULATION
36' WIDE

COMPOSITE CROSS SECTION

TYPICAL ROAD SECTIONS

FIGURE 7

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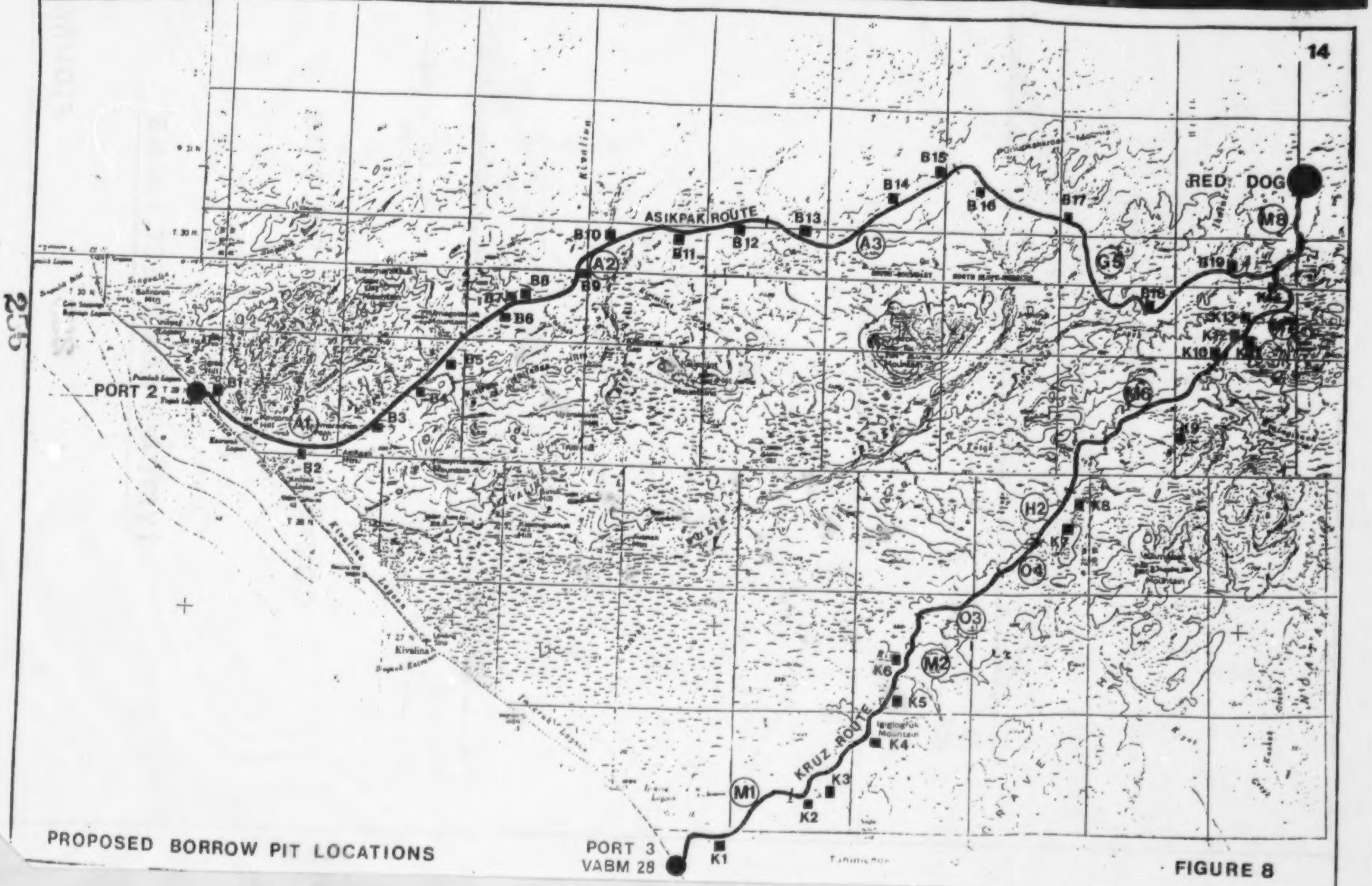
[redacted]


14
RED DOG
M8
B19
B18
G5
B17
B16
B15
B14
A3
B13
B12
ASIKPAK ROUTE
B11
B10
A2
B9
B8
B7
B6
B5
B4
B3
A1
B1
B2
PORT 2
K13
K12
K11
K10
K9
M6
K8
H2
K7
O4
O3
M2
K6
K5
Igichuk Mountain
K4
KRUZ ROUTE
K3
K2
M1
K1
PORT 3
VABM 28
Kivalina Lagoon
Kivalina

PROPOSED BORROW PIT LOCATIONS

FIGURE 8

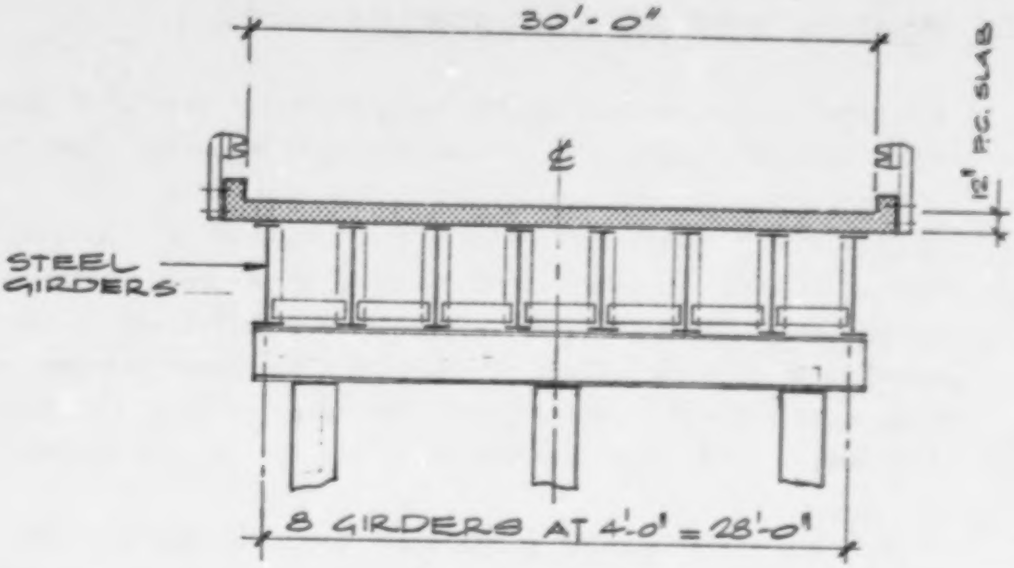
II. DESCRIPTION OF PROPOSED ROAD ALTERNATIVES (continued)

All water courses crossed by the selected routes have been identified, their drainage basins defined and areas measured. Peak flows at each crossing were calculated using peak unit flows of 80 cfs/sq. mile for drainage basins smaller than 10 sq. miles and 55 cfs/sq. mile for drainage basins exceeding 10 sq. miles. Lengths of bridges were calculated using a peak flow of 5 fps and an average water depth of 4 to 5 feet. Bridges have been used wherever peak flow exceeds 800 cfs. Culvert sizes are based on capacities ranging from 10 cfs for 24-inch diameter to 710 cfs for 120-inch diameter.

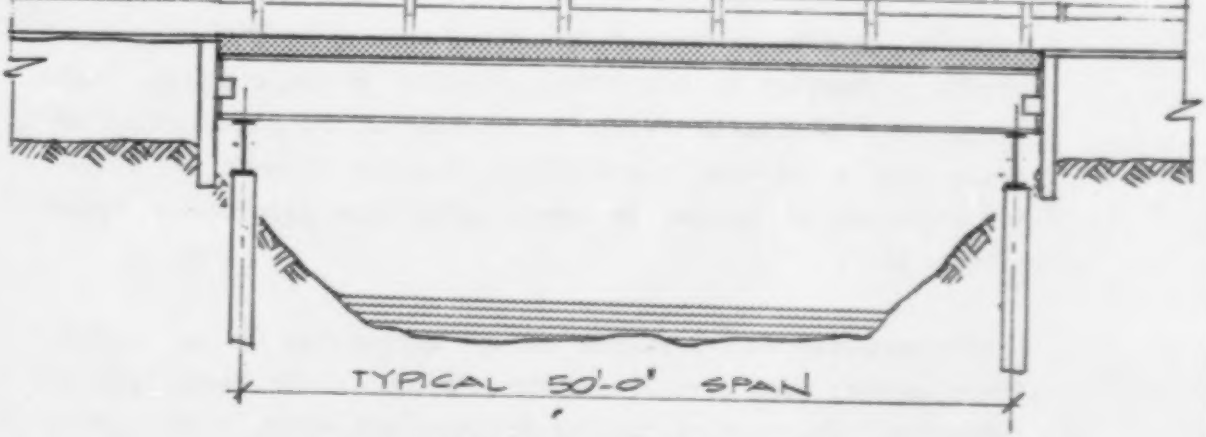
Bridges are designed using standardized decks suitable for spans of 50 to 60 feet with a width of 30 feet face to face of guardrails. These units would be utilized wherever possible. Construction would consist of steel beams supporting composite precast concrete deck slab units with abutments and piers of steel adfreeze piles into permafrost (Figure 9). Pier design would be modified wherever a significant thaw bulb exists.

Culverts would be galvanized corrugated steel pipe with rip-rap or similar protection to side slopes adjacent to the crossing. Culverts (48-inch diameter) would be provided at all well-defined dry swales and in addition 24 and 30-inch diameter culverts are allowed for at a nominal spacing to handle sheet flow and roadway runoff (Figure 10).

Preliminary engineering studies and all engineering for the Southern Route options were carried out for Cominco by R&M Consultants of Anchorage. Engineering for the Northern and Noatak Route options has been carried out by Cominco Engineering Services Ltd. A consistent methodology has been used throughout.


30'-0"
℄
12" P.C. SLAB
STEEL GIRDERS
8 GIRDERS AT 4'-0' = 28'-0'

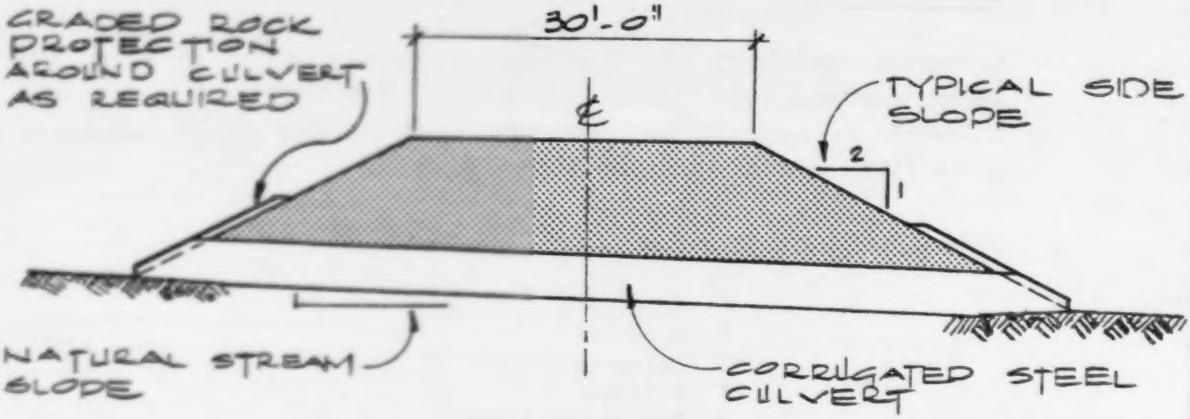
BRIDGE SECTION


TYPICAL 50'-0' SPAN

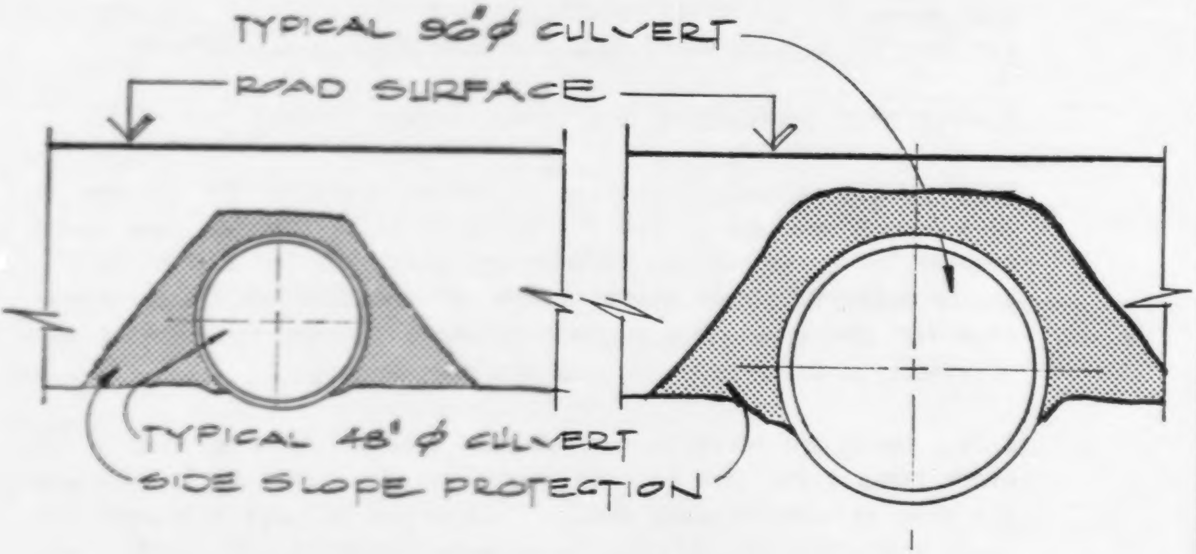
BRIDGE ELEVATION

TYPICAL BRIDGE

FIGURE 9


GRADED ROCK PROTECTION AROUND CULVERT AS REQUIRED
30'-0"
℄
TYPICAL SIDE SLOPE
2
1
NATURAL STREAM SLOPE
CORRUGATED STEEL CULVERT

CROSS SECTION


TYPICAL 96"ϕ CULVERT
ROAD SURFACE
TYPICAL 48"ϕ CULVERT
SIDE SLOPE PROTECTION

ELEVATIONS

TYPICAL CULVERTS

FIGURE 10

III. COST ESTIMATES

Estimated road costs are developed as "Direct Costs" to which are added "Indirect Costs" to obtain a "Net Total Cost". A contingency allowance is added to this Net Total Cost to give the "Total Estimated Capital Cost" for road construction.

Direct costs are developed under five headings:

- Road Fill
- Turnouts
- Culverts
- Bridges
- Royalty on Fill

Road fill cost is generated as two elements: first, the fill which includes all extraction and placement costs and, second, the haulage cost. The base costs used in this estimate are $9.20 per cubic yard for fill and $1.30 per cubic yard mile for haulage. These prices also allow for all costs associated with cut and fill construction and insulation costs where composite construction is utilized.

Turnout cost is generated in a similar manner to road fill cost.

Culverts are estimated assuming all culverts are of the average 80 feet length and are priced according to size. Prices used range from $6,400 for a 24-inch diameter up to $61,200 for a 120-inch diameter culvert. These costs include all installation costs, provision for the side slope protection and allowance for mitered end treatment on culverts of 66-inch diameter or larger.

Bridge costs are based on nominal deck area which is defined as net width times span. The base cost used in this estimate is $400 per sq. foot of nominal deck area. This price includes allowance for deck, substructures, piling, watercourse training work, side slope protection and provides for all field construction and deck placement. Actual costs for major bridges on the Asikpak route may well be higher than the base case, if hydraulic or other considerations dictate longer spans than those provided for with the standard deck.

III. COST ESTIMATES (continued)

Royalty on fill is estimated at a rate of $0.45 per cubic yard of fill extracted. This item also includes a provision for reclamation work at the borrow sites.

Indirect costs are estimated as 7.3% of direct costs. Indirect costs cover the costs of engineering design and project management.

The Contingency allowance is estimated at 5.7% of net total costs and is an allowance to cover a portion of the anticipated risk in carrying out the road construction element of the project.

All direct costs included in the estimate include an allowance for construction support, construction supervision, taxes and insurance.

Costs for the Kruz route option have been developed on two bases:

- Alternative 1 assumes that fill will be drawn from borrow sources dispersed throughout the route as defined (Figure 8).

- Alternative 2 assumes that fill will be drawn only from borrow sources located outside the Krusenstern National Monument. This alternative includes the cost of constructing an ice road from close to the port to borrow sources 7 and 8. This ice road will permit construction equipment access to these borrow sources which would provide fill for construction in the northern part of the monument. (Figure 8).

  Another approach to constructing this alternative has also been estimated. This approach allows for flying construction equipment into the Red Dog airstrip and building the road from two fronts only. There was no significant difference between estimated costs for these two approaches. The estimate for the ice road approach is used in this report.

Costs for the Asikpak route option have been developed on the basis that fill will be drawn from borrow sources dispersed throughout the route.

III. COST ESTIMATES (continued)

A control has been applied to ensure a uniform approach to road fill costs for both route options. This involves making direct comparison of costs for Asikpak route segments with those for a route segment with similar terrain characteristics estimated for one of the Southern routes.

For instance, Asikpak route segment A5 is compared with Southern route segment M5. Both segments are on gently graded lower slopes on the fringe of wetland areas and have average borrow availability.

Operating costs consist of all items for which costs will vary dependent on road route mileage. These include concentrate haulage, personnel movement, haulage of inbound supplies and road maintenance.

Cominco, as part of their normal estimating procedure, frequently make use of a suitably experienced third party to carry out an audit of their estimates. If a reasonable correlation is achieved, confidence in the validity of the estimate is enhanced and estimate credability improved.

The estimate for the Kruz route option has been audited by Morrison-Knudsen of Boise, Idaho. This company is a large and reputable civil engineering contractor with extensive experience of construction in remote areas. They have been involved in Alaskan construction for 40 years.

This audit was completed in May 1984 and the road element took the form of an independent estimate carried out in accordance with Morrison-Knudsen's usual in-house methods for preparing construction bids. Their estimate is based on a reduced nominal fill thickness of 5 feet compared with the 6-1/2 feet designed depth used in the Cominco estimate.

III. COST ESTIMATES (continued)

Morrison-Knudsen's estimate of total net cost is $68.2 million to which they added a contingency allowance of $4.4 million for an estimated total cost of $72.6 million. This provides an unusually close correlation with Cominco's estimate of $74.7 million. For construction work of this type at a remote site, it is very unusual for independent estimates to agree so closely.

ASIKPAK ROUTE
QUANTITIES AND COSTS — FILL

SEGMENT	FILL QUANT- YD^3	FILL COST ($)	HAUL QUANT (YD^3 Mi,	HAUL COST ($)	NET TOTAL COST ($)	TOTAL COST ($M)
A1	1121858	10321094	2352697	3058506	13379600	13.75
A2	1682710	15480932	1347462	1751701	17232633	17.78
A3	1044780	9611976	1361976	1770569	11382545	11.78
G5	1917731	17643125	2445331	3178930	20822055	21.55
M8	224580 *550800	2066136 *5060000	74044	96257	7222393	7.47
TOTAL		60183263		9855963	70039226	72.3

* EXCAVATION

ASIKPAK ROUTE
CONSTRUCTION COST ESTIMATE—CULVERTS

SEG-MENT	24" DIA @$6400	30" DIA. @$7200	48" DIA. @$15360	54" DIA. @17440	66' DIA. @$30960	78' DIA @$36000	96" DIA @$41200	108" DIA @$44080	120" DIA @$61200	NET TOTAL	TOTAL ($M)
A1	30 192000	13 93600	16 245760		3 92880	2 72000		3 132240		67 828480	0.85
A2	38 243200	28 201600		9 156960	6 185760	4 144000	21 865200			106 1796720	1.86
A3	13 83200	40 288000	5 76800	2 34880		4 144000	16 659200		3 183600	83 1469680	1.51
G5	54 345600	5 36000	5 76800	5 87200	2 61920	1 36000	2 82400			74 725920	0.75
M8	2 12800		21 322560	5 87200						28 422560	0.44
	137 876800	86 619200	47 721920	21 366240	11 340560	11 396000	39 1606800	3 132240	3 183600	358 5243360	5.41

ASIKPAK ROUTE
CONSTRUCTION COST ESTIMATE - BRIDGES

SEGMENT	WATERCOURSE CROSSED	LENGTH (FEET)	NET COST ($)	TOTAL COST ($ MILLION
A1	TATIGIROK CREEK	30	360 000	
	UMARACHEK CREEK	50	600 000	
	ASIKPAK RIVER	150	1800 000	
	TRIBUTARY OF ASIKPAK RIVER	45	540 000	
	ASIKPAK RIVER	30	360 000	
			3660000	3.66
A2	KIVALINA RIVER	700	8 400 000	
	SOUTH FORK OF KIVALINA RIVER	220	2 640 000	
	TRIBUTARY OF KIVALINA RIVER	35	420000	
			11440000	11.46
G5	NORTH FORK OF WULIK RIVER	250	3000000	
	TRIBUTARY OF WULIK RIVER	30	360000	
	WULIK RIVER	380	4560000	
	TRIBUTARY OF IKALUKROK RIVER	70	840000	
	IKALUKROK RIVER	400	4800000	
			13560000	13.56
				28.7

ASIKPAK ROUTE

CONSTRUCTION COST SUMMARY

SEGMENT	LENGTH (MILES)	FILL ($MILLION)	TURNOUTS ($MILLION)	CULVERTS ($MILLION)	BRIDGES ($MILLION)	TOTAL ($MILLION)
A1	14.0	13.75	0.08	0.85	3.66	18.34
A2	19.5	17.78	0.08	1.86	11.46	31.18
A3	12.5	11.78	0.06	1.51	0	13.35
G5	21.5	21.55	0.12	0.75	13.56	35.98
M8	7.5	7.47	0.02	0.42	0	7.91
TOTAL	75.0	72.3	0.4	5.4	28.7	106.8

ROYALTY ON FILL	4.0
TOTAL DIRECT COSTS	110.8
INDIRECT COSTS	8.1
NET TOTAL	118.9
CONTINGENCY	6.8
TOTAL COST	125.7

TOTAL ANNUAL OPERATING COST 207 5.93

KRUZ ROUTE

(USING BORROW SOURCES THROUGHOUT ROUTE)

CONSTRUCTION COST ESTIMATE - FILL

SEGMENT	FILL QUANTITY (CU. YD.)	FILL COST ($)	HAUL QUANTITY (CU. YD. MILE)	HAUL COST ($)	NET TOTAL COST ($)	TOTAL COST ($M)
M1	576570	5304444	887420	1153646	6458090	6.70
M2	937770	8627484	1597985	2077380	10704864	11.29
O3	357380	3287896	2137830	2779179	6067075	6.25
O4	149190	1372548	605979	787773	2160321	2.22
H2	308620	2839304	490778	638011	3477315	3.60
M6	799170	7352364	3090460	4017598	11369962	11.76
M7	512100	4711320	226346	294250	5005570	5.18
M8	224580 *550800	2066136 *5060000	74044	96257	7222393	7.47
		40621496		11844094	52465590	54.47

* EXCAVATION

KRUZ ROUTE

CONSTRUCTION COST ESTIMATE - CULVERT

SEGMENT	24' DIA. @ $6400	30" DIA	48" DIA.	54" DIA.	66' DIA.	78" DIA.	96" DIA @ $41200	NET TOTAL	TOTAL ($MILLION)
M 1	9 $ 57600	2 14400	10 $153600	5 $ 87200	2 $61920	2 $72000	—	30 446720	0.47
M 2	17 $108800	—	17 $261120	9 $156960	2 $61920	2 $72000	2 $82400	49 743200	0.77
O3	1 $ 6400	5 36000	12 $184320	5 $ 87200	—	—	—	23 313920	0.32
O4	—	—	7 $107520	4 $69760	—	—	2 $82400	13 259680	0.27
H 2	2 $ 12800	2 30720	3 $ 52320	1 $30960	—	—	—	8 126800	0.13
M6	15 $ 96000	—	12 $184320	5 $87200	1 $ 30960	—	—	33 398480	0.42
M7	7 $ 44800	—	5 $ 76800	2 $ 34880	2 $ 61920	2 $ 72000	2 $82400	20 372800	0.38
M8	2 $ 12800	—	21 $322560	5 $87200	—	—	—	28 422560	0.44
	53 $339200	9 $ 81120	87 $1342560	36 $641360	7 $216720	6 $216000	6 $247200	204 $3084160	3.20

KRUZ ROUTE

CONSTRUCTION COST ESTIMATE-BRIDGES

SEGMENT	WATERCOURSE CROSSED	LENGTH (FEET)	NET COST ($)	TOTAL COST ($M)
M2	TRIBUTARY OF OMIKVIOROK RIVER	50	600000	
	TRIBUTARY OF OMIKVIOROK RIVER	50	600000	
	OMIKVIOROK RIVER	160	1920000	
			3120000	3.18
M6	TUTAK CREEK	100	1200000	
	TRIBUTARY OF TUTAK CREEK	40	480000	
			1680000	1.72
				4.90

KRUZ ROUTE

(USING BORROW SOURCES THROUGHOUT ROUTE)

CONSTRUCTION COST SUMMARY

SEGMENT	LENGTH (MILES)	FILL ($MILLION)	TURNOUTS ($ MILLION)	CULVERTS ($ MILLION)	BRIDGES ($MILLION)	TOTAL ($MILLION)
M1	8.60	6.70	0.04	0.47	—	7.21
M2	12.88	11.29	0.06	0.77	3.18	15.12
03	5.10	6.25	0.04	0.32	—	6.66
04	1.95	2.22	0.01	0.27	—	2.52
H2	3.69	3.60	0.02	0.13	—	3.76
M6	11.50	11.76	0.07	0.42	1.72	14.02
M7	5.49	5.18	0.02	0.38	—	5.60
M8	7.44	7.47	0.03	0.44	—	7.97
TOTAL	56.65	54.47	0.29	3.20	4.90	62.9

ROYALTY ON FILL	3.0
TOTAL DIRECT COSTS	65.9
INDIRECT COSTS	4.8
NET TOTAL	70.7
CONTINGENCY	4.0
ROAD TOTAL COST	74.7

TOTAL ANNUAL OPERATING COST	4.48

KRUZ ROUTE

(NOT USING BORROW SOURCES INSIDE KRUSENSTERN NATIONAL MONUMENT)

CONSTRUCTION COST ESTIMATE - FILL

SEGMENT	FILL QUANTITY (CU. YD)	FILL COST ($)	HAUL QUANTITY (CU. YD MILE)	HAUL COST ($)	NET TOTAL COST ($)	TOTAL COST ($ MILLION
M1	576570	5304444	13588633	17665223	22969667	23.25
M2	937770	8627484	14994942	19493425	28120909	28.68
03	357380	3287896	2501660	3252158	6540054	6.67
04	149190	1372548	605979	787773	2160321	2.22
H2	308620	2839304	490778	638011	3477315	3.60
M6	799170	7352364	3090460	4017598	11369962	11.76
M7	512100	4711320	226346	294250	5005570	5.18
M8	224580 *550800	2066136 *5060000	74044	96257	7222393	7.47
TOTAL		40621496		46244695	86866191	88.9

* EXCAVATION

KRUZ ROUTE

(NOT USING BORROW SOURCES INSIDE KRUSENSTERN NATIONAL MONUMENT)

CONSTRUCTION COST SUMMARY

SEGMENT	LENGTH (MILES)	FILL ($MILLION)	TURNOUTS ($MILLION)	CULVERTS ($ MILLION)	BRIDGES ($MILLION)	TOTAL ($MILLION)
M1	8.60	23.25	0.14	0.47	—	23.86
M2	12.88	28.68	0.15	0.77	3.18	32.78
03	5.10	6.67	0.08	0.32	—	7.07
04	1.95	2.22	0.01	0.27	—	2.50
H2	3.68	3.60	0.02	0.13	—	3.75
M6	11.50	11.76	0.07	0.42	1.72	13.97
M7	5.49	5.18	0.02	0.38	—	5.58
M8	7.44	7.27	0.03	0.44	—	7.94
TOTAL	56.65	88.9	0.5	3.20	4.90	97.5

ICE ROAD CONSTRUCTION ROYALTY ON FILL	1.2 3.0
TOTAL DIRECT COSTS	101.7
INDIRECT COSTS	7.4
NET TOTAL	109.1
CONTINGENCY	6.2
ROAD TOTAL COST	115.3

TOTAL ANNUAL OPERATING COST 4.48

ATTACHMENT F

Supplemental Corporate Information
Cominco Alaska

State of Alaska

Department of Commerce and Economic Development

Certificate

The undersigned, as Commissioner of Commerce and Economic Development of the State of Alaska, and custodian of corporation records for said State, hereby certifies that

COMINCO AMERICAN INCORPORATED

a corporation organized under the laws of Washington did, on the 26th day of December 1973, qualify as a foreign corporation authorized to do business in the State of Alaska; and

I FURTHER CERTIFY that the said corporation has not withdrawn since qualifying herein, and that all required corporate reports have been filed to date and all corporate taxes and fees due this office are paid to date.

IN TESTIMONY WHEREOF, I execute this certificate and affix the Great Seal of the State of Alaska this

2nd day of September A. D. 19 83

RICHARD A LYON
COMMISSIONER OF COMMERCE AND
ECONOMIC DEVELOPMENT

BY-LAWS

of

COMINCO AMERICAN INCORPORATED

ARTICLE I

Shareholders

Section 1. Place of Meetings: Any meetings of the shareholders, including the annual meeting, may be held at such places and at such times, within or without the State of Washington, as may be designated and as set forth in the Notice of Meeting.

Section 2. Annual Meeting: The annual meeting of the shareholders of the corporation shall be held once in each calendar year and at such date and time as the Board of Directors may designate, at which time the shareholders shall elect a Board of Directors for the ensuing year and transact any and all other business that may come before the meeting.

Section 3. Special Meetings: Special meetings of the shareholders of the corporation may be called by the Chairman of the Company, Chairman of the Executive Committee of the Board of Directors, if one is so designated, the President or by a quorum of the directors, or by the holder or holders of not less than one-tenth (1/10) of the shares of common stock outstanding and entitled to vote at the meeting.

Section 4. Notice of Meetings: Written notice for the holding of the annual meeting of the shareholders or of a special meeting of the shareholders shall be given by the Secretary of the corporation or by the person or persons authorized to call the meeting. The notice, shall state the place, day, and hour of the meeting and, in the case of a special meeting of the shareholders, the purpose of the special meeting. The notice shall be mailed to each holder of shares of common stock of the corporation outstanding and entitled to vote at the meeting by first class United States mail not less than ten (10) days nor more than fifty (50) days before the date designated for the annual meeting and not less than two (2) days before the date designated for holding a special shareholders meeting. The address to which the notice is mailed shall be that designated by the shareholder.

Section 5. Quorum: The presence, in person or by proxy, of the holders of a majority of the shares of common stock entitled to vote shall constitute a quorum at all meetings of the shareholders and the majority vote of such shares shall be the acts of the meeting, unless otherwise required by law or these By-Laws.

Section 6. Meeting by Consent and Waiver of Notice: When the shareholders entitled to vote are present at any meeting, except the annual meeting, and sign a written consent thereto on the record of such meeting, then the holding of that meeting and the acts of that meeting are valid, regardless of how called, noticed, or where held.

Section 7. Informal Action of Shareholders: The shareholders, in lieu of their meeting together, may act by a resolution in writing approved, consented to and signed by all of the shareholders entitled to vote on the action taken and said act or acts shall be as valid and effective as if same had been passed at any other meeting of the shareholders. Such resolution shall be filed by the Secretary of the corporation in the corporate records as the minutes of a shareholders meeting.

Section 8. Voting Rights: Bona fide common shareholders, having stock in their names on the stock books of the corporation at least ten (10) days prior to any meeting at which a vote shall be taken, are entitled to one vote for each share of stock so held; provided, however, that when voting for directors, each shareholder shall be entitled to accumulate his vote by giving one candidate for director as many votes as the number of such directors to be elected multiplied by the number of his shares shall equal, or by distributing such votes on the same principal among any number of such candidates.

Section 9. Proxies: A Shareholder entitled to vote may do so either in person or by proxy in writing. A proxy shall not be valid after eleven (11) months from the date of its execution unless a longer period is expressly stated in the proxy. A proxy may be revoked by a writing of a later date or by attendance of the shareholder at the meeting and so declaring.

Section 10. Adjournments: Any meeting of the shareholders may adjourn from day to day or from time to time. Prior to adjournment, the time and place of the continuation of the meeting shall be announced and, unless the adjournment is for more than fourteen (14) days, no other notice of the adjourned meeting or of the business to be transacted shall be necessary. Matters pertaining to the adjournment shall be set forth in the minutes of the meeting. Upon reconvening pursuant to the adjournment, if a quorum is present any business may be transacted which could have been transacted at the meeting originally called.

In case of any meeting involving the election of directors, the adjournment must be for a time no later than the next day and those who attend the adjourned meeting although less than a quorum as provided in these By-Laws shall nevertheless constitute a quorum for the purpose of electing directors.

ARTICLE II

Board of Directors

Section 1. Number and Term of Office: The business, property and affairs of the corporation shall be managed by the Board of Directors which shall be comprised of never less than three (3) persons, but which by resolution duly passed by the Board of Directors may at any time be increased to any number not exceeding fifteen (15) or, having once been increased, may be reduced to any number not less than three (3). The directors shall be elected annually by the shareholders at their annual meeting and shall hold their office for one (1) year or until their successors are elected and qualified.

Section 2. Committees: The Board of Directors, by resolution adopted by a majority of the full Board of Directors, may designate from among its members an Executive Committee and one or more other committees including, without limitation, a Compensation Committee, and such committees shall have the powers granted to them by the Board of Directors, the By-Laws or by Law, but no committee shall have the authority of the Board of Directors in reference to amending the articles of incorporation, adopting a plan of merger or consolidation, recommending to the shareholders the sale, lease, exchange or other disposition of all or substantially all the property and assets of the corporation otherwise than in the usual and regular course of its business, recommending to the shareholders a voluntary dissolution of the corporation or a revocation thereof, or amending the By-Laws of the corporation.

Section 3. Vacancies: Upon the death, resignation or removal of a director from office, the Board of Directors may elect a director to hold office until the next annual election and a successor is elected and qualified. Any directorship to be filled by the Board of Directors by reason of an increase in their number may be filled by the Board of Directors for a term of office continuing only until the next annual election of the directors by the shareholders.

Section 4. Compensation: Directors shall receive such compensation and expenses for their services as Directors as the Board of Directors may designate.

Section 5. Removal: At a meeting called expressly for that purpose any or all of the Directors may be removed with or without cause by a vote of the holders of a majority of the shares then entitled to vote at an election of directors.

Section 6. Place of Meetings: Meetings of the Board of Directors may be held at such time and at such places, either within or without the state, as designated in a Notice of Meeting.

Section 7. Annual Meeting: The Board of Directors shall meet each year immediately after the conclusion of the annual meeting of the shareholders and shall elect officers and consider such other business as may come before it.

Section 8. Special Meeting: A special meeting of the Board of Directors may be called at any time by the Chairman of the Company, Chairman of the Executive Committee, the President or a Vice President if a member of the Board of Directors, or by a quorum of the directors whenever he or they may deem it expedient.

Section 9. Notice of Meetings: Written notice for the holding of the annual meeting of the Board of Directors shall be given not less than ten (10) days in advance of the meeting, nor not less than two (2) days in advance of the meeting in the case of a special meeting of the Board of Directors, by notice issued by the Secretary after having first been authorized so to do.

Section 10. Quorum: Until changed by resolution of the Board of Directors three (3) directors is a sufficient number to form the Board for the transaction of business of the corporation and every decision of a majority of those directors present at a meeting in which a quorum is present shall be the act of the Board of Directors.

Section 11. Meeting by Consent and Waiver of Notice: When all directors are present at any meeting and sign a Waiver of Notice and a consent to the holding of such meeting, and such Waiver and consent is made a part of the record of such meeting the holding of such meeting and the acts of that meeting are valid regardless of how called, noticed or where held.

Section 12. Informal Action of the Board of Directors: The directors, in lieu of their meeting together, may act by a resolution in writing approved, consented to and signed by all of the directors and said act or acts shall be as valid and effective as if same had been passed at any other meeting of the directors. Such resolution shall be filed by the Secretary of the corporation in the corporate records as the minutes of a directors meeting.

Section 13. Attendance by Conference Communication: Members of the Board of Directors or any committee designated by these By-Laws or appointed by the Board of Directors may participate in a meeting of such Board or Committee by means of a conference telephone or similar communications equipment by means of which all persons participating in the meeting can hear each other at the same time and participation by such means shall constitute the presence in person at the meeting of all persons so participating in the meeting.

Section 14. Adjournment: Any meeting of the Board of Directors may adjourn from day to day or from time to time. Prior to adjournment the time and place of the continuation of the meeting shall be announced and, unless the adjournment is for more than fourteen (14) days, no other notice of the adjourned meeting or of the business to be transacted shall be necessary. Matters pertaining to the adjournment shall be set forth in the minutes of the meeting. Upon reconvening pursuant to the adjournment if a quorum is present any business may be transacted which could have been transacted at the meeting originally called.

Section 15. Other Capacity: A director may serve the corporation in the capacity other than a director and may receive such compensation for services rendered in the other capacity as the Board of Directors may designate.

A director may be or become a director or officer of any company promoted by this corporation or in which it may be interested as a shareholder or otherwise.

No director shall be disqualified in respect of his office by reason of his holding any office or place of profit in this corporation or in any company in which this corporation is a shareholder or in any company holding shares in this corporation; nor shall any contract or arrangement entered into by or on behalf of this corporation in which any director is in any way interested (whether by reason of being a shareholder of or otherwise interested in any other company for that reason) be void and every director so interested and having declared his interest shall have the right to vote respecting any such contract or arrangement; nor shall any director be liable to account to this corporation for any profit realized from any such office or place of profit or realize by any such contract or arrangement by reason only of such director holding that office or place of profit or fiduciary relation thereby established.

ARTICLE III

Officers, Managers, or Representatives

Section 1. Officers: The officers of the corporation shall consist of a President, one or more Vice Presidents, a Secretary, a Treasurer, and such other officers or assistant officers as the Board of Directors shall designate, or as are designated in these By-Laws. Any two or more offices may be held by the same person except the office of Chairman, if one is so elected, or President and Secretary.

Section 2. Election and Term of Office: The officers of the corporation shall be elected annually by the Board of Directors at their annual meeting at which time they may, in their discretion, elect a Chairman of the Company, who may also be President and, in the absence of any agreement to the contrary shall hold office until their successors are elected and qualified.

Section 3. Vacancies: Upon the death, resignation, or removal of an officer from office, the Board of Directors may elect or appoint a replacement to hold office until the next annual election and a successor is elected and qualified.

Section 4. Other Officers, Managers or Representatives: The Board of Directors may appoint or elect such other officers, managers or representatives as, in its discretion, it deems necessary to serve at the will of the Board.

Section 5. Chief Executive Officer: The Board of Directors may designate the Chairman of the Company, if one is so elected, or the President to be the Chief Executive Officer, who shall be the general executive head of the company and who shall exercise the general supervision, management and control of all business and affairs of the company. In the absence of such a designation the President shall be the Chief Executive Officer of the company.

Section 6. Duties of the Chairman: The Chairman of the Company shall preside at all meetings of the directors or shareholders and shall perform other duties as are prescribed by these By-Laws and as the directors may, from time to time, require.

Section 7. Duties of the President: The President shall have such duties as may be assigned to him, from time to time, by the Board of Directors or as are prescribed by the By-Laws of the company.

Section 8. Duties of Vice Presidents: The Vice President, or if more than one, the Vice Presidents in order of seniority (as determined by the directors) shall be vested with all the powers and shall perform all the duties of the President in the absence or disability or refusal to act of the President, save that no Vice-President shall preside at a meeting of the Directors who is not a member of the Board of Directors. The Vice President, or if more than one, the Vice-Presidents, shall also have such other powers and duties as may, from time to time, be assigned to him or them, respectively, by the directors.

Section 9. Secretary: It shall be the duty of the Secretary to keep alphabetically the names and addresses of all shareholders; he shall, along with the President, sign all of the stock certificates of the company and keep the records thereof; the seal of this corporation shall be in his custody; he shall give or cause to be given all notices of all meetings of the directors or shareholders; and shall record all proceedings of the meetings of shareholders and directors; and shall perform such other duties as may be required by laws, these By-Laws or as the directors may require of him.

Section 10. Treasurer: It shall be the duty of the Treasurer to keep safely all moneys and securities of this corporation, and he shall deposit, disburse or deliver the same under the direction of the directors; he shall submit a statement of his accounts when called for by the President or directors, and shall perform such other duties as may be required by laws, these By-Laws or as the Board of Directors may require from time to time and to give such bonds as the directors may require.

ARTICLE IV

Shares of Stock

Section 1. Capital Stock: The capital stock of the corporation shall be as set forth in the Articles of Incorporation. Issuance of stock shall be subject to the provisions of the Articles of Incorporation and the By-Laws. All certificates of stock shall be signed by the President or such other officers designated by the Board of Directors and countersigned by the Secretary or any Assistant Secretary, and shall be impressed with the corporate seal. Signatures and the corporate seal may be imprinted thereon as facsimilies thereof if authorized by the Board of Directors.

Section 2. Treasury Stock: Stock of the corporation held by the corporation shall be treasury stock, and shall neither vote nor participate in dividends, and its disposition shall be determined by the Board of Directors.

Section 3. Transfers: Transfers of stock shall be subject to these By-Laws and applicable law of the State of Washington. Transfers of stock shall be made only on the books of the corporation. The old certificate, properly endorsed, shall be surrendered to the Secretary and cancelled before a new certificate is issued.

Section 4. Close of Stock Book: The stock book of the corporation shall be closed against tranfers for a period of ten days before payment of dividends and for a period of ten days before each meeting of the shareholders.

Section 5. Loss of Certificate: In case of loss or destruction of a certificate of stock, a new certificate shall be issued in lieu thereof after satisfactory proof has been made to the Board of Directors of the loss or destruction and, in addition, upon the giving of satisfactory security, by bond or otherwise, as the Board of Directors shall require, against any loss to the corporation by reason of the issuance of a duplicate. A replacement certificate shall have the word "DUPLICATE" marked on its face.

Section 6. Mailing Address Required: At the time of issuance of stock, the Secretary of the corporation shall obtain from the recipient shareholder his mailing address which shall be entered in the stock ledger and shall become a part of the permanent records of the corporation. It shall thereafter be the obligation of each shareholder to advise the Secretary of any change of such address and the Secretary shall promptly enter such a change in the stock ledger. First Class mail, whether regular, airmail, registered, or certified, addressed to such address shall be sufficient for all corporate notices and for all official communications between the shareholders pertaining to corporate business, except where specifically set forth otherwise in these By-Laws.

ARTICLE V

Seal

Section 1. Seal: The seal of this corporation shall bear the following inscription in the words "COMINCO AMERICAN INCORPORATED - Washington" in the form of a circle, and with the words "CORPORATE SEAL" in the center of the circle.

ARTICLE VI

Miscellaneous Corporate Acts

Section 1. Corporate Funds: All funds of the corporation shall be deposited in the bank or banks designated by the Board of Directors. All checks, drafts or orders for the payment of money and all notes and acceptances and bills of exchange shall be signed by such officer or officers or designated persons of the corporation as the Board of Directors shall designate.

Section 2. Execution of Written Instruments: All written instruments requiring formal execution on behalf of the corporation shall be executed by the President or a Vice President and attested by the Secretary and impressed with the seal of the corporation; provided, however, that the Board of Directors may in any particular instance designate another procedure for execution.

Section 3. Dividends: Dividends shall be paid from the surplus earnings of the corporation as the Board of Directors shall from time to time designate, but no dividend shall be paid that will impair the capital structure of the corporation.

Section 4. Sale, Merger, Dissolution or Mortgage of all Corporate Property: At a meeting of all the shareholders called, among other things, for that purpose, the shareholders representing two-thirds of the stock entitled to vote may dissolve and distribute the assets of the corporation, direct the sale, merger, or mortgaging of all or substantially all of the corporate properties, and in such case, the directors shall cause such conveyances, documents, or mortgages to be made accordingly.

ARTICLE VII

Indemnity

Section 1. Indemnity: Any person made a party to any action, suit or proceedings, by reason of the fact that he is or was a director, officer, employee, trustee or representative of the corporation, or of any corporation, partnership, trust or joint venture in which he served as such at the request of the corporation, shall be indemnified by the corporation against the reasonable expenses, including attorney's fees, judgments, fines or amounts actually and necessarily incurred by him in connection with the defense of such action, suit or proceedings, or in connection with any appeal therein, if he acted in good faith and in a manner he reasonably believed to be in or not opposed to the best interests of the corporation, and, with respect to any criminal action or proceeding, had no reasonable cause to believe his conduct was unlawful. The termination of any action, suit or proceeding by judgment, order, settlement, conviction, or upon a plea of nolo contendere or its equivalent, shall not, of itself, create a presumption that the person did not act in good faith and in a manner which he reasonably believed to be in or not opposed to the to the best interests of the corporation, and, with respect to any criminal action or proceeding, had reasonable cause to believe that his conduct was unlawful.

The foregoing right of indemnification shall not be deemed exclusive of any other rights to which any officer, director, employee, trustee or representative may be entitled apart from the provisions of this section.

The amount of indemnity to which any officer or any director may be entitled shall be fixed by the Board of Directors, except that in any case where there is no disinterested majority of the Board available, the amount shall be fixed by either independent legal counsel in a written opinion or by the shareholders.

The corporation shall have power to purchase and maintain insurance on behalf of any person who is or was a director, trustee, officer, employee, or representative of the corporation, or is or was serving at the request of the corporation, partnership, joint venture, trust or other enterprise against any liability asserted against him and incurred by him in any such capacity or arising out of his status as such, whether or not the corporation would have the power to indemnify him against such liability under the provisions of this section.

ARTICLE VIII

Amendments

Section 1. Repeal, Amendment, Adoption of By-Laws: The By-Laws of the corporation may be changed or amended at any time by the Board of Directors subject, however, at all times to the power of the shareholders to change, alter, repeal or to adopt new By-Laws.

APPROVED
AS TO FORM AND FILED

SEP 27 1965

A. LUDLOW KRAME
SECRETARY OF STATE

BY
ASSISTANT SUPERVISOR OF CORPORATI

RESTATED ARTICLES OF INCORPORATION
of
Cominco American Incorporated

We, the undersigned, H. W. BOETZKES, a resident and citizen of the State of Washington, United States of America, and H. C. LAKE, a resident and citizen of the State of Oregon, United States of America, do hereby associate ourselves together for the purpose of forming a corporation under and pursuant to the laws of the State of Washington, and to that end do hereby make, execute and enter into Articles of Incorporation, in triplicate, certifying as follows, to-wit:

I.

The name of the corporation shall be "Cominco American Incorporated."

II.

The objects for which this corporation is formed are as follows:

(a) To locate, purchase, acquire, trade, own, use, develop, improve, operate, sell, deal and trade in, encumber, and alienate deposits, claims prospects, necessary or desirable machinery, tools, equipment, and adjuncts thereto. and to use, sell, dispose of, and encumber the products thereof.

(b) To purchase, lease, exchange, acquire by foreclosure or otherwise, real, personal, mixed, tangible and intangible property, assets, rights, claims, equities, franchises, business concerns and undertakings of every kind, and character, and to sell, assign, convey, deal in, lease, pledge, mortgage and dispose of all or any part thereof, and to use, operate, continue, develop, improve and manage or otherwise turn to account all or any of the properties or rights of this corporation.

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(c) To engage in the mercantile, merchandise, real estate, brokerage, commission, consignment, warehouse, manufacturing and transportation business, the conduct and operation of irrigation works, the generation and distribution of electrical energy, the conduct of public utilities and the rendering of public service in any of the phases or branches thereof, and to acquire, own, use and dispose of the necessary tools, machinery, equipment, stocks, buildings, stores, wharves, warehouses, real estate, vehicles, boats, vessels, aeroplanes, and other property, real and personal, necessary therefor and to dispose of the products thereof, and to assess and collect compensation for services rendered, goods, wares and merchandise sold and delivered, and benefits conferred, and to exercise the right of eminent domain.

(d) To establish, form and subsidize or otherwise assist in the promotion or foundation of other companies or the prosecution of any other undertaking or enterprise of any description which may advance directly or indirectly the objects of this corporation, and to secure by purchase, trade, subscription, or otherwise acquire and to deal and trade in, the stock, certificates of interest, debentures, bonds or other securities of other companies, trusts or other organizations.

(e) To loan money and grant credits; to incur indebtedness, borrow or raise money with or without security, to evidence the same by proper instruments, and to secure the payment of money borrowed or raised when deemed expedient by the issue of debentures, bonds, chattel mortgages, real estate mortgages, deeds of trust, or the pledging of collateral or the giving of other security and upon such terms as to priority and discount, or otherwise as shall be thought fit and to purchase or redeem (at a premium if deemed expedient) any notes, debentures, bonds, mortgages or securities of this corporation.

(f) To pay for any rights or property acquired by or services rendered to this corporation in connection with its promotion, organization, operation or maintainance, in fully or partly paid shares of stock, debentures, bonds, other securities of this corporation, cash, privileges or anything of value.

(g) To pay any commission or brokerage, for the purpose of securing the subscription or sale of all or any part of the stock of this corporation.

(h) To procure this corporation to be legalized, domiciled, or recognized in any foreign country, state or colony and to transact any business there.

(i) To do all such acts and things as are incidental, conducive, necessary or permissable to or under the above objects in their broadest sense or which will aid any of the above objects, and to establish and carry on any business or undertaking permissable under the law which may seem calculated to enhance the value of any of the property or rights of this company or to facilitate the disposition thereof and to engage in any and all kinds of business that a natural person might or could engage in and to engage in such business as the Board of Trustees may deem to the advantage of this corporation.

III.

1. The authorized capital stock of this Corporation shall be Thirty-Five Million Dollars ($35,000,000.00) divided into:

   (i) Seven hundred thousand (700,000) shares of common stock with a par value of Ten Dollars ($10.00) each with full and equal voting privileges;

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(ii) Two million eight hundred thousand (2,800,000) shares of six percent (6%) non-voting non-cumulative redeemable participating preferred shares of the par value of Ten Dollars ($10.00) each (hereinafter called the "preferred shares") having attached thereto the rights, restrictions, conditions and limitations hereinafter set out.

2. The holders of the preferred shares shall be entitled to receive and this corporation shall pay thereon, quarterly, semi-annually or annually, as and when declared by the board of directors out of the moneys of this corporation properly applicable to the payment of dividends fixed preferential non-cumulative cash dividends at the rate of six percent (6%) per annum on the amounts from time to time paid up thereon. The board of directors shall be entitled from time to time to declare part of the said preferential dividend for any fiscal year notwithstanding that the dividend for that fiscal year shall not be declared in full. If, within four months after the expiration of any fiscal year of this corporation, the board of directors in its discretion shall not have declared the said fixed preferential dividend or any part thereof on the preferred shares for that fiscal year, then the rights of the holders of the preferred shares to such dividend or to any undeclared part thereof for such fiscal year shall be forever extinguished. No dividend shall at any time be declared or paid or set aside for the common shares or any part thereof for any fiscal year unless the fixed preferential dividend for such fiscal year on all the preferred shares then outstanding shall have been declared and paid or a sum set aside for payment thereof.

3. Whenever in any calendar year a dividend or dividends aggregating sixty cents a share have been paid or declared on the common shares outstanding any and all further dividends (not being the preferential dividends on the preferred shares) declared and payable in such calendar year shall be declared and paid in equal amounts per share on all the preferred shares and common shares at the time outstanding without preference or distinction as between preferred shares and common shares.

4. This corporation may at any time or times purchase for cancellation the whole or any part of the preferred shares outstanding from time to time by such means and at such price or prices as the board of directors may authorize.

5. This corporation may redeem at any time all or from time to time any part of the outstanding preferred shares on payment to the holders thereof of the amount paid up thereon, together with all declared and unpaid preferential non-cumulative cash dividends thereon, but such right to redeem may not be exercised in any case prior to the end of five years from the date of issuance of the preferred share or shares to the holder thereof.

6. In any case of redemption of preferred shares under the provisions of clause 5 hereof, this corporation shall at least twenty (20) days before the date specified for redemption mail to each person who at the date of mailing is a registered holder of preferred shares to be redeemed a notice in writing of the intention of this corporation to redeem such preferred shares. Such notice shall be mailed in a prepaid letter addressed to each such shareholder at his address as it appears on the books of this corporation or in the event of the address of any such shareholder not so appearing then to the last known address of such shareholder; provided, however, that accidental failure to give any such notice to one (1) or more of such shareholders shall not affect the validity of such redemption. Such notice shall set out the redemption price and the date on which redemption is to take place and if part only of the shares held by the person to whom it is addressed is to be redeemed the number thereof so to be redeemed. On or after the date so specified for redemption this corporation shall pay or cause to be paid to or to the order of the registered holders of the preferred shares to be redeemed the redemption price thereof on presentation and surrender at the head office of this corporation or any other place designated in such notice of the certificates representing the preferred shares called for redemption. If a part only of the shares represented by any certificate be redeemed a new certificate for the balance shall be issued at the expense of this corporation. From and after the date specified for redemption in any such notice the preferred shares called for redemption shall cease to be entitled to dividends and the holders thereof shall not be entitled to exercise any of the rights of shareholders in respect thereof unless payment of the redemption price shall not be made upon presentation of certificates in accordance with the foregoing provisions, in which case the rights of the shareholders shall remain unaffected. This corporation shall have the right at any time after the mailing of notice of its intention to redeem any preferred shares as aforesaid to deposit the redemption price of the shares so called for redemption or of such of the said shares represented by certificates which have not at the date of such deposit been surrendered by the holders thereof in connection with such redemption to a special account in any bank named in such notice to be paid without interest to or to the order of the respective holders of such preferred shares called for redemption upon presentation and surrender to such bank of the certificates representing the same and upon such deposit being made or upon the date specified for redemption in such notice, whichever is the later, the preferred shares in respect whereof such deposit shall have been made shall be redeemed and the rights of the holders thereof after such deposit or such redemption date, as the case may be, shall be limited to receiving without interest their proportionate part of the total redemption price so deposited against presentation and surrender of the said certificates held by them respectively.

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7. The holders of the preferred shares shall not have any voting rights for the election of directors nor, without limiting generality, for any other purpose; nor shall they be entitled to attend shareholders' meetings.

8. In the event of the liquidation or dissolution of this corporation or any other distribution of its assets among the shareholders, the holders of the preferred shares shall be entitled to receive the par value of their holdings in priority to any distribution to the holders of the common shares or any shares of any other class ranking junior to the preferred shares, but the holders of the preferred shares shall not be entitled to share any further in the distribution of assets.

IV.

The duration of this Corporation shall not be limited to any number of years, but shall be PERPETUAL.

V.

The management of the Corporation shall be vested in a Board of Directors which shall consist of not less than three (3) persons and the number, qualification, terms of office, manner of election, time and place of meeting, and powers and duties of the Directors shall be such as are prescribed by the By-laws of the Corporation. The names and addresses of the Directors in office at the time of the adoption of these Restated Articles are:

R. Hendricks
Room 3100
630 Dorchester Boulevard West
Montreal 2, Quebec, Canada

F. E. Burnet
East 1224 - 27th Avenue
Spokane, Washington

J. C. MacLean
818 Riverside Avenue
Spokane, Washington

H. T. Fargey
Room 3100
630 Dorchester Boulevard West
Montreal 2, Quebec, Canada

A. O. Wolff
Room 3100
630 Dorchester Boulevard West
Montreal 2, Quebec, Canada

R. D. Perry
Room 3100
630 Dorchester Boulevard West
Montreal 2, Quebec, Canada

D. D. Morris
Room 3100
630 Dorchester Boulevard West
Montreal 2, Quebec, Canada

VI.

The principal place of business of this Corporation shall be located at the city of Spokane, in the County of Spokane, and State of Washington.

IN WITNESS WHEREOF, we have set our hands and seals under these presents this 14th day of September, 1965.

F. E. Burnet, President

ATTEST:

J. D. Rae, Secretary-Treasurer

STATE OF WASHINGTON)
: ss.
County of Spokane)

F. E. Burnet and J. D. Rae, being first duly sworn on oath, depose and say:

(a) That they have been authorized to execute the within Restated Articles by resolution of the Board of Directors adopted on the 8th day of September, 1965.

(b) That the Restated Articles correctly set forth the text of the Articles of Incorporation as amended and supplemented to the date of the Restated Articles, and

(c) That the Restated Articles supersede and take the place of theretofore existing Articles of Incorporation and Amendments thereto.

F. E. Burnet

J. D. Rae

SUBSCRIBED AND SWORN to before me this 14th day of September, 1965.

Mary A. Duncan
Notary Public in and for the State of Washington, residing at Spokane

ATTACHMENT G

Correspondence

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION X
1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101

REPLY TO
ATTN OF: M/S 443

February 6, 1984

Mr. H.M. Giegerich, President
Cominco Alaska
5660 "B" Street
Anchorage, Alaska 99502

Dear Mr. Giegerich:

The EPA has reviewed the revised consolidated ANILCA Title XI application submitted by your company December 14, 1983, for Federal permits necessary to construct a transportation system across Cape Krusenstern National Monument. With regard to the proposed wastewater discharge from the port facility, the information submitted is adequate for EPA to begin processing your application.

Sincerely,

Roger K. Mochnick

Roger K. Mochnick, Chief
Water Permits Section

cc: Ron Kreizenbeck, AOO (Juneau)
Floyd Sharrock, NPS

DEPARTMENT OF THE ARMY
ALASKA DISTRICT. CORPS OF ENGINEERS
POUCH 898
ANCHORAGE, ALASKA 99506

8 February 1984

REPLY TO
ATTENTION OF:
Regulatory Functions Branch
Special Actions Section

Mr. Harry Noah
Cominco Alaska
5660 B Street
Anchorage, Alaska 99502

Dear Mr. Noah:

This letter is in regards to your Title XI application for the transportation system (071-OYD-2-830359, Chukchi Sea 9) and your Department of the Army (DA) permit application for certain activities at the mine site (071-OYD-4-840012, Chukchi Sea 11).

These applications are complete and soon a public notice for each permit application will be published as an appendix in the Red Dog Mine Environmental Impact Statement (EIS). The public notices are required to solicit comments regarding your project. Any comments received will be evaluated and considered in our permit decision. We expect to make a permit decision approximately 30 days after the publication of the notice of availability of the Final EIS.

Sincerely,

Larry L. Reeder

Larry L. Reeder
Chief, Special Actions Section
Regulatory Functions Branch

Copy Furnished:

Mr. Bill Riley
Environmental Evaluations Branch (M/S 443)
Environmental Protection Agency
1200 6th Avenue
Seattle, Washington 98101

RECEIVED
FEB 0 [illegible]
EEB/404 REVIEW
EPA-REGION 10

United States Department of the Interior

NATIONAL PARK SERVICE
Alaska Regional Office
2525 Gambell Street, Room 107
Anchorage, Alaska 99503-2892

IN REPLY REFER TO:

L76 (ARO-P)

FEB 10 1984

Mr. Harry A. Noah
Environmental Coordinator
Cominco Alaska
5660 B Street
Anchorage, Alaska 99502

Dear Mr. Noah:

We have reviewed the revised Title XI application submitted by Cominco January 31, 1984. It is our understanding that the application has been submitted to the Corps of Engineers (Corps) and the Environmental Protection Agency (EPA) and that it will be published in this form in the Red Dog Mining Project Draft Environmental Impact Statement (DEIS) along with our review comments and those of the Corps and the EPA.

We have no objection to the application appearing in this form in the DEIS. However, it does not contain all information required by Title XI of the Alaska Natural Interest Lands Conservation Act and applicable laws insofar as the National Park Service is concerned. The following corrections must be made and the indicated additional information (earlier requested in our letter dated January 6, 1984) must be provided.

Item 4. Because Cominco Alaska is a private corporation, items (d) and (e) of the supplemental data sheet are to be completed.

Item 7. You have indicated that the concentrate storage structure is a related facility (to the use system), as is the borrow area in which it is to be constructed. The borrow area (and structure) are to be situated on lands selected and tentatively approved for conveyance to NANA. Therefore at such time as you provide the information requested in Item 15, it will be necessary to anticipate the possibility that title conveyance may not occur and that the facility would therefore remain on Cape Krusenstern Monument lands administered by the National Park Service. Because title to these lands has not been conveyed, the acreage (211 acres) will be figured in the application fee to be provided as part of the Title XI application.

Your response (attachment A, page 1, paragraph 6) to our request for a description and explanation of why related structures and facilities (identified by Cominco) are minimally necessary for construction, operation, and/or maintenance of the system, is inadequate. The National Park Service must have sufficient fiscal data to make an independent evaluation of your conclusion as indicated in attachment A.

We appreciate that the information in the detail requested in our January 6 letter item 7(e)(f) is not now available. But we will require it to be provided at such time as engineering studies are completed that are adequate to realistically identify and evaluate the system in relation to the natural and cultural landscape.

Item 9. We repeat the request of our January 6 letter, that the status of required applications for state and local governmental permits indicated in item 9 be consistent with the information provided in item 14.

Item 10. If we understand your application correctly, the lineal right-of-way through Cape Krusenstern National Monument is 24 miles. Based on 36 CFR 14.22(a)(3), there will be a nonrefundable fee of $500.00 for each 20 miles or fraction thereof for a total of $1,000. For each 40 non-linear acres or fraction thereof, there is authorized a charge of $250. Since there has been no determination concerning borrow as a related structure or facility, we will defer the acre charge until such time as borrow might be authorized.

Item 15. We note the continuing request indicated in our January 6 letter for additional information and appropriate documentation as follows:

a) Detailed cost figures for the proposed construction, operation, and maintenance, including the economic feasibility of the proposed transportation system.

b) The cost of the alternatives to routing the system through Cape Krusenstern National Monument, including the economic feasibility of these alternatives.

c) The cost of alternatives locating no borrow sites within Cape Krusenstern National Monument, including the economic feasibility of these alternatives.

d) Any expected impact on the national security interests of the United States that may result from approval or denial of the application.

Sincerely,

Roger J Contor

Regional Director
Alaska Region

Cominco Alaska

Mr. Floyd Sharrock
U.S. National Park Service
2525 Gambell, Room 107
Anchorage, AK 99503

August 20, 1984

Dear Floyd:

As per our conversation of August 16, 1984, this letter confirms Cominco's completion of the summer geotechnical program within Cape Krusenstern National Monument. Our investigations have indicated the need for one small realignment of the road and the adding of one borrow site. (Please refer to the enclosed map.) This modification is suggested because of the poor soil conditions which were identified on the more northerly segment of the road. Due to the generally poor soil conditions found along this segment of the road, the alignment modification will not change Cominco's initial cost estimates. Maintaining the road route along its original route would have increased the cost of the road. (Cost estimates were outlined in "An Economic Evaluation of Alternative Road Routes from Red Dog to Transhipment Site, June 1984".) In the review of the proposed change, no adverse environmental impacts have been identified by Cominco.

Other than the one suggested change, no other major modifications are anticipated in the road alignment at this time.

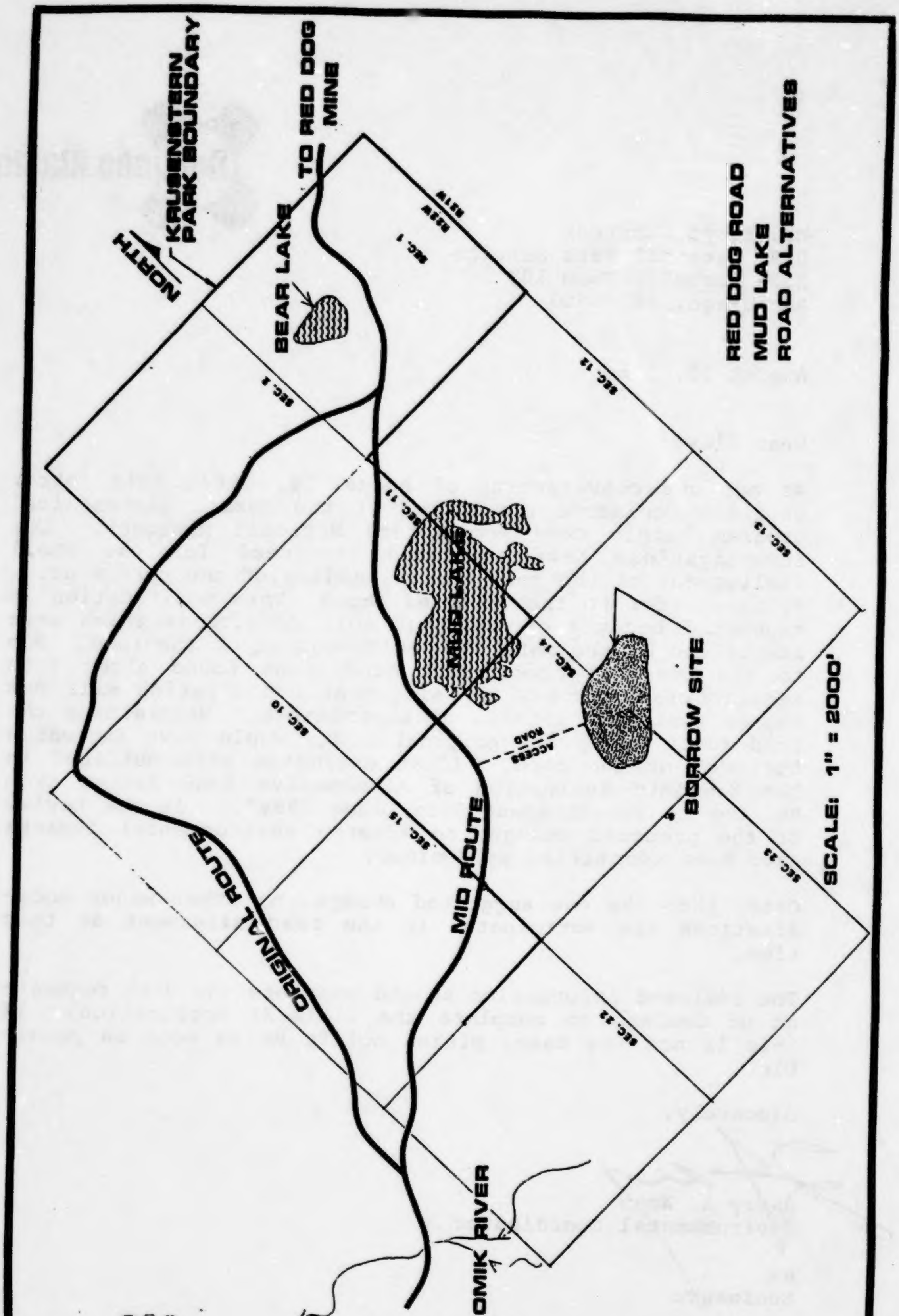
The enclosed information should complete the data requested of Cominco to complete the Title XI application. If this is not the case, please notify us as soon as possible.

Sincerely,

Harry A. Noah
Environmental Coordinator

aw
Enclosure

cc: Mr. William Riley, EPA


NORTH
KRUSENSTERN PARK BOUNDARY
TO RED DOG MINE
BEAR LAKE
MUD LAKE
BORROW SITE
ACCESS ROAD
MID ROUTE
ORIGINAL ROUTE
OMIK RIVER
R32W
R31W
SEC. 1
SEC. 2
SEC. 10
SEC. 11
SEC. 12
SEC. 13
SEC. 14
SEC. 15
SEC. 22
SEC. 23

RED DOG ROAD
MUD LAKE
ROAD ALTERNATIVES

SCALE: 1" = 2000'

Cominco Alaska/5660 "B" Street/Anchorage, Alaska 99502/Tel. (907) 563-3686

Cominco Alaska

9/4

Alaska Region Office

AUG 29 '84

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Roger Contor
Regional Director
National Park Service
2525 Gamble
Anchorage, Alaska 99501

August 27, 1984

Dear Roger:

Cominco would like to clarify it's Title XI Application in regards to the status of road alignment and Barrow site location. It is our understanding that the final detailed road alignment will not be determined until after Congress makes their decision on the Title XI permit. Final alignment would be determined in the field in conjection with the final design of the road and bridge crossings. We would like to request that Title XI decision be based on a 3/4 mile corridor and that the road would be located within this corridor.

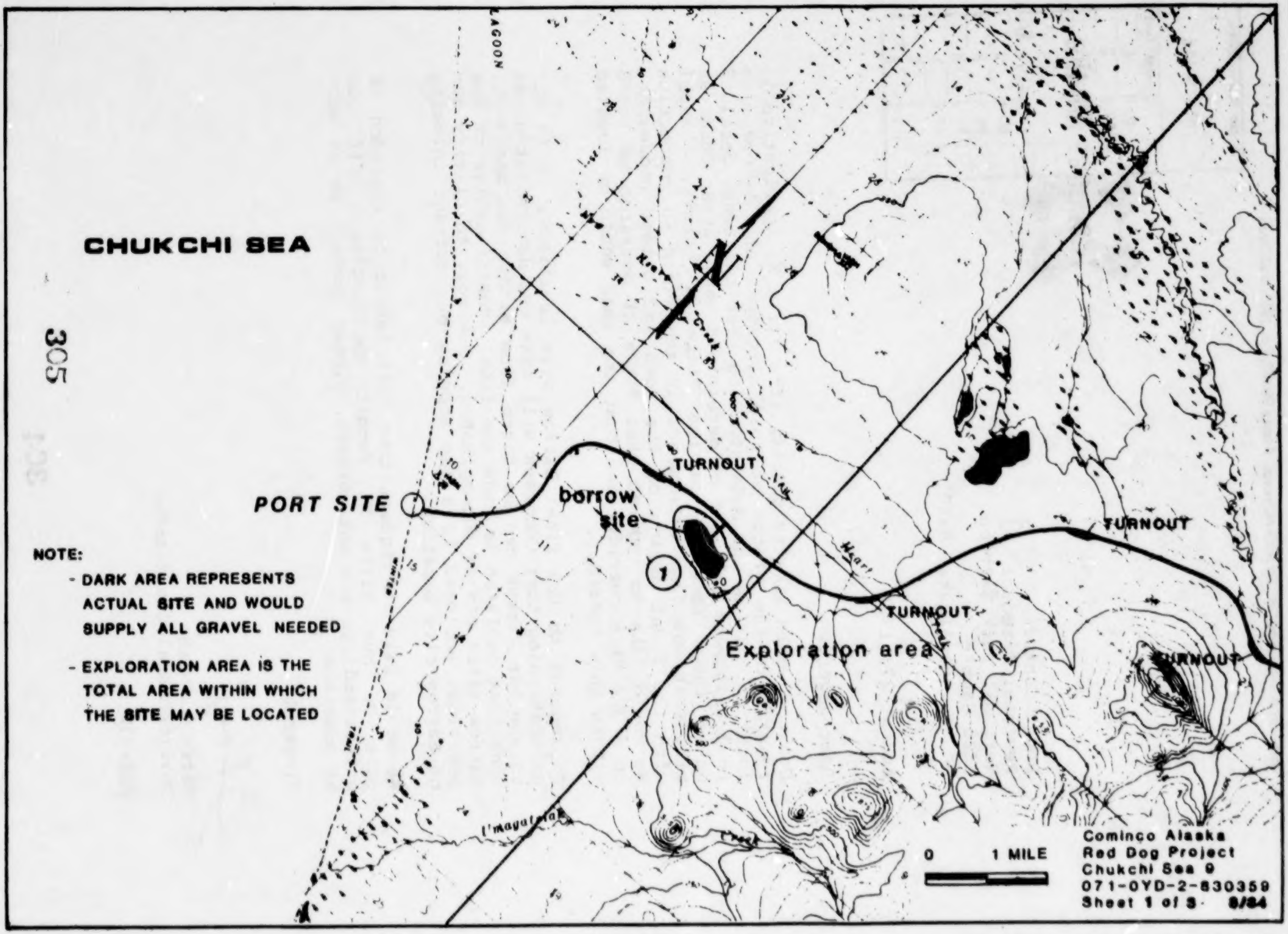
In regards to the final Barrow site locations, it is our understanding that Congress will make the determination as to whether Barrow can be taken from within the monument. Once that decision is made the final identification of the Barrow sites can be accomplished. However, to clarify our position, enclosed is a map showing our current thinking on Barrow site location.

We would like to request that this letter be included as part of our Title XI Permit Application. If our understandings are not correct, please contact us as soon as possible.

Sincerely,

Harry A. Noah
Environmental Coordinator

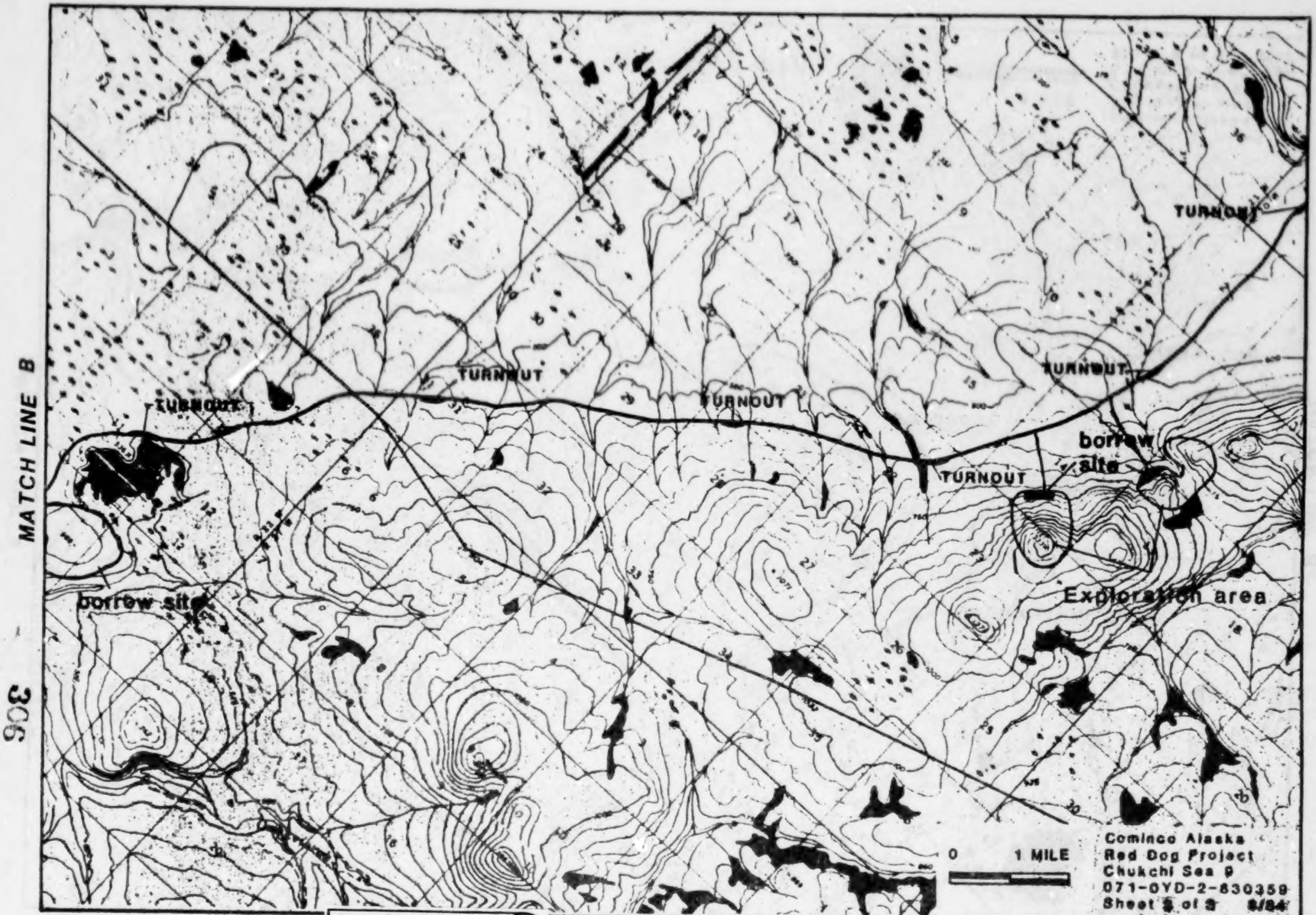
HAN/jlh


CHUKCHI SEA
LAGOON
PORT SITE
TURNOUT
borrow site
①
TURNOUT
Exploration area
TURNOUT
TURNOUT
Heart
Creek
WINTER TRAIL
0
1 MILE

NOTE:

- DARK AREA REPRESENTS ACTUAL SITE AND WOULD SUPPLY ALL GRAVEL NEEDED
- EXPLORATION AREA IS THE TOTAL AREA WITHIN WHICH THE SITE MAY BE LOCATED

Cominco Alaska
Red Dog Project
Chukchi Sea 9
071-0YD-2-830359
Sheet 1 of 3 8/84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Chukchi Sea 9
071-0YD-2-830359
Sheet 3 of 3 8/84

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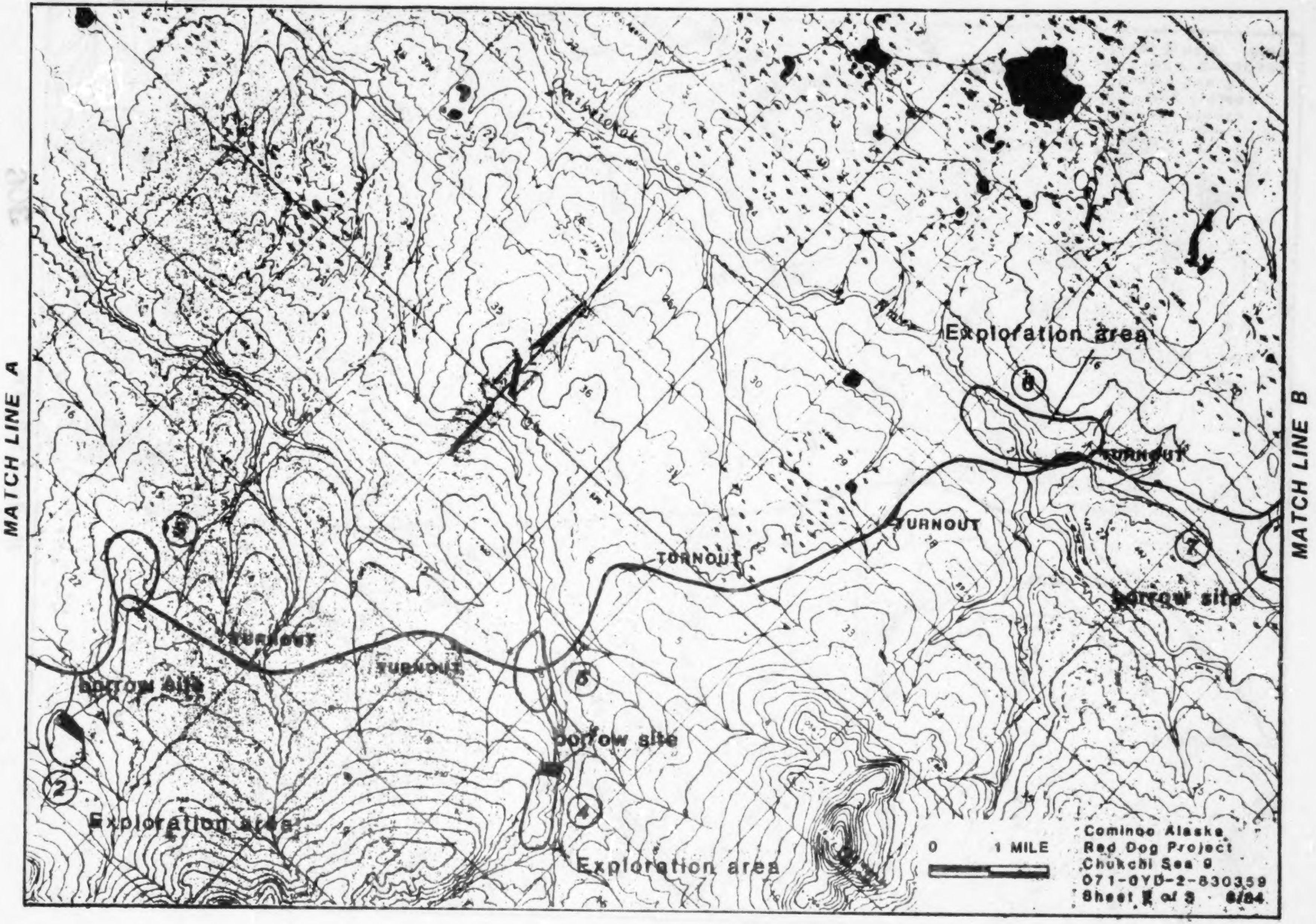
best available copy.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Red Dog Project
Chukchi Sea 9
071-0YD-2-830359
Sheet [illegible] of 3 8/84

March 3, 1849

United States Department of the Interior
NATIONAL PARK SERVICE
ALASKA REGIONAL OFFICE
2525 Gambell Street, Room 107
Anchorage, Alaska 99503 - 2892

IN REPLY REFER TO:
L76 (ARO-CTS)

AUG 31 1984

Mr. Harry Noah
Environmental Coordinator
Cominco Alaska
5660 B Street
Anchorage, Alaska 99502

Dear Mr. Noah:

In our letter of February 10, 1984, we itemized the deficiencies in the "Title XI" permit application by Cominco Alaska for a right-of-way across Cape Krusenstern National Monument. The additional information provided in the report, An Economic Evaluation of Alternative Road Routes from RED DOG to a Road/Marine Transhipment Site, and in your letter dated August 27, 1984, appears to complete the information required by Title XI and necessary for National Park Service purposes.

Sincerely,

Robert L Peterson
Acting Regional Director
Alaska Region

cc:
Joe Williamson, COE
Bill Riley, EPA
Paul Gates, DOI

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L76(ARO-CTS)

31 AUG 1984

Mr. Barry Morehead
Department of Transportation
Division of Administration
P.O. Box 1648
Juneau, Alaska 99802

Dear Mr. Morehead:

As we discussed a few weeks ago, and again today, we are forwarding a copy of the report, An Economic Evaluation of Alternative Road Routes from RED DOG to a Road/Marine Transhipment Site.

In the opinion of the Chief, Division of Facility Design and Maintenance, Alaska Region, National Park Service, the report is suitable for an independent evaluation of the proposed construction. A copy of that opinion is attached. As indicated in the introduction to the report, the intent was to provide route selection and engineering data sufficient to permit a detailed independent review.

The issues that we would like the Department of Transportation to address are: appropriateness of the engineering design for the area, and for the purposes of the construction; accuracy of the cost estimates based on engineering design; and evaluation of the comparative costs for the alternative routes.

The applicant company has advised us that its engineers will be available upon request to discuss these data with you. Contact person is Harry Noah, Environmental Coordinator, Cominco Alaska (907/563-3686).

Sincerely,

/s/ FLOYD SHARROCK

Floyd W. Sharrock
Chief, Office of Consulting
and Technical Services

Enclosure

FWSharrock:le:8/30/84

United States Department of the Interior
NATIONAL PARK SERVICE
ALASKA REGIONAL OFFICE
2525 Gambell Street, Room 107
Anchorage, Alaska 99503 - 2892

IN REPLY REFER TO:
L76 (ARO-CTS)

10 SEP 1984

Mr. Harry Noah
Environmental Coordinator
Cominco Alaska
5660 B Street
Anchorage, Alaska 99502

Dear Mr. Noah:

In your letter of August 27, you indicate certain clarifications, or modifications, in Cominco's Title XI right-of-way application. We understand these to be: 1) the addition of a proposed borrow site approximately one-half mile south of Mud Lake, 2) a rerouting of the proposed road between Bear Lake and the Omikviorok River along the west shore of Mud Lake, and 3) the addition to the previously requested right-of-way of a three-fourths mile wide corridor within which the road right-of-way will be located.

We note these changes without comment. They will be forwarded for incorporation in the final environmental impact statement as part of the Title XI application.

Sincerely,

Roger J Contor

Regional Director
Alaska Region

cc:
B. Koula, DOI
R. Stenmark, WASO-650
Wm. Riley, EPA
M. Shaver, Superintendent, NWA

U.S. Department
of Transportation

**Federal Highway
Administration**

Alaska Division

P.O. Box [illegible]648
Juneau, Alaska [illegible]02

September 26, 1984

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Floyd W. Sharrock, Chief
Office of Consulting and Technical Services
National Park Service, Alaska Regional Office
2525 Gambell Street, Room 107
Anchorage, Alaska 99503-2892

Dear Mr. Sharrock:

As requested by your August 31, 1984 letter, we have reviewed the report, An Economic Evaluation of Alternative Road Routes from RED DOG to a Road/Marine Transhipment Site.

Based on the information provided in the report, the roadway design is appropriate for the intended purpose. The cost estimates are reasonable and compare favorably with bid prices for roadway work performed by the State of Alaska in the northwest part of the state. Computation of costs for the alternative routes is consistent with good engineering practice and should provide a good basis for comparative evaluation.

If additional information and/or evaluation of particular design details is desired, we suggest you contact the Nome District of the State of Alaska, Department of Transportation and Public Facilities.

Sincerely yours,

Barry F. Morehead
Division Administrator

Robert E. Ruby

By: Robert E. Ruby
Assistant Division Administrator

Appendix 7

Cultural Resources Protection

Advisory Council On Historic Preservation

The Old Post Office Building
1100 Pennsylvania Avenue, NW, #809
Washington, DC 20004

January 26, 1984

Mr. Floyd Sharrock
National Park Service
2525 Gambell
Anchorage, Alaska 99503

Dear Floyd,

This is with regard to our telephone conversation today concerning the draft environmental impact statement on the granting of rights-of-way for facilities connected with the Red Dog Mine, and with regard to our earlier meeting on the same subject.

As you know, NPS has not yet requested the comments of the Council on this undertaking pursuant to Section 106 of the National Historic Preservation Act and our regulations, 36 CFR Part 800. This is appropriate, however, as you are at the draft EIS stage; we do not discourage earlier consultation, but many agencies find it convenient to provide the draft EIS as the Preliminary Case Report required by our regulations, and obtain our comments in time for inclusion in the final EIS, and we encourage this sort of integration of Section 106 and NEPA responsibilities.

The approach you have described to me verbally, in which Section 106 consultation with the State Historic Preservation Officer and Council will lead to either protection in place of, or data recovery from, National Register-eligible archeological sites already identified through intensive survey of the areas to be affected by the undertaking, seems to be a reasonable way to proceed. We will look forward to receiving your formal request for comments, and to bringing our review to a prompt conclusion.

Sincerely,

Thomas F. King, Director
Office of Cultural Resource Preservation

STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF PARKS AND OUTDOOR RECREATION

BILL SHEFFIELD, GOVERNOR

225A CORDOVA STREET
ANCHORAGE, ALASKA 99501
PHONE: (907) 276-2653

January 30, 1984

File: 3130-1 (NPS)

Mr. Roger Contor, Regional Director
Alaska Regional Office
National Park Service
2525 Gambell, Rm. 107
Anchorage, AK 99503

Dear Mr. Contor:

We have reviewed the Draft Environmental Impact Statement for the Red Dog Mining Project.

In general, we feel that it is a well-done document that responds to the critical issues. As for heritage resources, there is little specific information presented beyond the number of sites to be impacted. However, more complete data is readily available in the cited reports by Hall. It appears that the level of archaeological survey has been adequately intensive to identify most, if not all, of the sites in the project area (except those, if any, that are deeply buried and cannot be discovered by normal survey techniques).

The general procedure for dealing with impacts to heritage resources is adequately presented. We concur with avoidance of sites if feasible and this appears to be the best alternative in the majority of cases. Some sites, of course, will require mitigation by data collection. We look forward to working with the Advisory Council for Historic Preservation and involved federal agencies in developing a Memorandum of Understanding on mitigation of National Register eligible sites and emergency procedures for sites discovered during construction (if any).

In conclusion, we concur that the project will have no significant adverse impact on cultural resources with appropriate mitigation efforts.

Please contact us at 265-4140 if there are any questions.

Sincerely,

Neil C. Johannsen
Director

By: Ty L. Dilliplane
State Historic Preservation Officer

United States Department of the Interior

NATIONAL PARK SERVICE
Alaska Regional Office
2525 Gambell Street, Room 107
Anchorage, Alaska 99503-2892

RECEIVED
SEP 4 1984
ENVIRONMENTAL EVALUATION BRANCH

IN REPLY REFER TO:
H24(ARO-CTS)

7 JUN 1984

Mr. Robert Fink, Acting Director
Advisory Council on Historic Preservation
730 Simms, Room 450
Golden, Colorado 80401

Dear Mr. Fink:

Pursuant to Title XI of the Alaska National Interest Lands Conservation Act, Cominco Alaska has filed a joint application with the Corps of Engineers, Environmental Protection Agency, and the National Park Service for permits necessary for the project. Operating under proposed rules for implementation of Title XI, the National Park Service (NPS) is the agreed upon "lead agency" for the consolidated application. In the capacity of lead agency, the NPS is requesting Advisory Council review and comment on the proposed federal action.

Earlier, you were provided with copies of the draft environmental impact statement (DEIS) for the project. In that document a route that, in part, transects Cape Krusenstern is identified as the preferred route for a transportation and utility system that extends from the mine site to the port. While the permit application to the NPS is only for a right-of-way across Cape Krusenstern National Monument, as the designated lead agency, we are soliciting Advisory Council comments for the entire project.

As indicated in the DEIS, most of the project area is within the Cape Krusenstern Archeological District, a National Historic Landmark. Field archeological survey along the proposed transportation corridor (mine to port) has occurred. Prehistoric and historic sites were identified as indicated in the DEIS. Level of intensity was adequate to determine with reasonable certainty the presence or absence of sites, but was not sufficiently intensive for construction clearance. There was no subsurface testing. As a condition of the permit, should one be granted, intensive "project clearance level" survey of the area of project impact will be conducted.

Pursuant to Section 106 of the National Historic Preservation Act, as amended, and 36 CFR 800 we have applied

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the Criteria of Effect and have determined that the proposed action covered by the DEIS will have no adverse effect by virtue of facilities design to avoid identified cultural sites, or by scientific data recovery in accordance with the Advisory Council's "Recommendations for Archeologi~~st~~cal Data Recovery," and in conformance with "Archeology and Historic Preservation; Secretary of the Interior's Standards and Guidelines." The cited standards for data recovery will apply to the two sites that cannot reasonably be avoided, and to any sites discovered in emergency situations.

Sincerely,

Robert L Peterson
Acting Regional Director
Alaska Region

cc:
State Historic Preservation Office
H. Noah, Cominco Alaska
W. Riley, EPA
P. Gates, DOI
J. Williamson, COE
J. Richter, Ott Water Engineers
J. Estus, NPS/ARO
K. Schoenberg, NPS/ARO

3 AUG 1984

BILL SHEFFIELD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF PARKS AND OUTDOOR RECREATION

XXXXXXXXXXXXXXXX Pouch 7001
~~225A CORDOVA STREET~~
ANCHORAGE, ALASKA XXX 99510
~~PHONE: (907) 276-2653~~

ALASKA [illegible]

File

8/3

July 30, 1984

File: 3440 (NPS)

Dr. Floyd Sharrock
Chief, Consulting & Technical Services
Alaska Regional Office, NPS
2525 Gambell Street, Room 107
Anchorage, AK 99503-2892

Dear Floyd:

Thank you for your letter of June 6, 1984 concerning the Red Dog Project in and near Cape Krusenstern National Monument.

We have reviewed the project documents and concur with your determination of "No Adverse Effect" with the conditions outlined in your June 7th letter (file no. H24 (ARO-CTS)) to the Advisory Council.

Please contact us at 265-4140 if there are any questions.

Sincerely,

Neil C. Johannsen
Director

Judith E. Bittner

By: Judith E. Bittner
State Historic Preservation Officer

TAS:tls

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AUG 29 1984
ENVIRONMENTAL EVALUATION BRANCH

Advisory
Council On
Historic
Preservation

The Old Post Office Building
1100 Pennsylvania Avenue, NW, #809
Washington, DC 20004

Reply to: 730 Simms Street, Room 450
Golden, Colorado 80401

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Sep 12 [illegible] '84

September 6, 1984

Mr. Roger Contor
Regional Director
National Park Service
Alaska Regional Office
2525 Gambell Street, Room 107
Anchorage, AK 99503-2892

REF: Red Dog Mining Project affecting Cape Krusentern National Monument, and Cape Krusentern Archeological District

Dear Mr. Contor:

On August 20, 1984, the Council's Western Division of Project Review received your determination as project lead agency that the referenced undertaking would have no adverse effect on the above properties which are listed on the National Register of Historic Places. We have reviewed your supporting documentation, but we cannot agree with your finding for the following reasons:

> Your no adverse effect determination is based on either avoidance or by negation of adverse effects by means of data recovery. As yet, a data recovery plan (or plans) and the requisite intensive survey and subsurface testing have not been accomplished. Therefore, its adequacy as a means to negate adverse effects cannot be assessed.

Therefore, the Executive Director objects to your determination.

Under Section 800.6(a)(2) of the Council's regulations, your acceptance of the following condition will eliminate the basis for our objection:

> Data recovery plans as referenced in your letter dated June 7, 1984, shall be developed in consultation with the Alaska State Historic Preservation Officer (SHPO). Data recovery plans shall be submitted, together with pertinent SHPO comments to Council staff for review. The Executive Director or his staff shall have 15-days in which to object to the plans. Should the Executive Director object to the provisions of a data recovery plan, the Executive Director shall either:

a) refer the matter to the Chairman pursuant to 36 CFR Section 800.6(b)(7); or

b) provide NPS with recommendations, which shall be taken into account in developing final data recovery plans.

If you agree to implement this condition, please sign on the concurrence line below, return this letter to us, and also send a copy to the Alaska State Historic Preservation Officer. This will then be incorporated into your determination and compliance with Section 106 and the Council's regulations will be complete.

Thank you for your continued cooperation.

Sincerely,

Robert Fink

Robert Fink
Chief, Western Division
of Project Review

I concur: *

Roger J Contor 13 Sept 1984
(date)

* Concurrence is with the further understanding that activities within the boundaries of Cape Krusenstern National Monument will be directed according to the guidelines of the current NPS-28 which is the basis for a Programmatic Memorandum of Agreement among the Advisory Council on Historic Preservation, the National Park Service, and the National Council of State Historic Preservation Officers.

J Wm

STATE OF ALASKA

BILL SHEFFIELD, GOVERNOR

OFFICE OF THE GOVERNOR

DIVISION OF POLICY DEVELOPMENT AND PLANNING
GOVERNMENTAL COORDINATION UNIT

POUCH AW (MS · 0165)
JUNEAU, ALASKA 99811
PHONE: (907) 465-3562

Certification of Consistency with the Alaska Coastal Management Program

Re: Department of the Army Permit
Application No. 071-OYD-2-830359
Applicant. Cominco Alaska

Section 307(c)(3) of the Coastal Zone Management Act of 1972 as amended by 16 USC 1456(c)(3) requires the applicant for a Federal permit to conduct an activity affecting land or water uses in the Alaska coastal zone to provide certification that the activity will comply with the Alaska Coastal Management Program (ACMP).

The proposed activity described in your permit application is within the ACMP, and the following certification is required before your application can be processed to Public Notice. Upon receipt of the signed, dated certification, the Public Notice will be issued and will include the certification statement. The Public Notice will be forwarded to the Division of Policy Development and Planning for its concurrence or objection. For additional information on the Alaska Coastal Management Program, contact the Office of Coastal Management, Pouch AP, Juneau, AK 99811, or the Division at the above address.

CERTIFICATION STATEMENT

I certify that, to the best of my knowledge and belief, the proposed activity described in Department of the Army Application No. 071-OYD-2-830359 complies with the approved Alaska Coastal Management Program, and will be conducted in a manner consistent with such programs.

Signature of Applicant

September 6, 1983
Date

WW:jo

STATE OF ALASKA

OFFICE OF THE GOVERNOR

OFFICE OF MANAGEMENT AND BUDGET
DIVISION OF GOVERNMENTAL COORDINATION

BILL SHEFFIELD, GOVERNOR

CENTRAL OFFICE
POUCH AW
JUNEAU, ALASKA 99811-0165
PHONE: (907) 465-3562

SOUTHEAST REGIONAL OFFICE
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Phone: (907) 465-3562

SOUTHCENTRAL REGIONAL OFFICE
2600 Denali Street
Suite 700
Anchorage, AK 99503-2798
Phone: (907) 274-1581

NORTHERN REGIONAL OFFICE
675 Seventh Avenue
Station H
Fairbanks, AK 99701-4596
Phone: (907) 456-3084

Registered Mail
Return Receipt
Requested

August 6, 1984

RECEIVED
AUG 14 1984
ENVIRONMENTAL EVALUATION
BRANCH

Mr. Harry Noah
Cominco Alaska
5660 "B" Street
Anchorage, AK 99502

Dear Mr. ~~Noah~~: HARRY

SUBJECT: RED DOG MINE TITLE 11 PERMIT PACKAGE
STATE I.D. NUMBER AK840525-20C

The Division of Governmental Coordination (DGC) has completed the review of Red Dog mining project against the standards of the Alaska Coastal Management Program. The project proposal consists of an inland open pit lead/zinc mine, mineral concentrator, a coastal shipping facility, and an interconnecting transportation system.

This conclusive consistency determination applies to the federal consistency requirements for your project and the following State and/or federal authorizations as per 6 AAC 50:

1. U.S. Army Corps of Engineers (COE) permits COE 071-OYD-4-840012 and COE 071-OYD-2-830359.

2. Environmental Protection Agency (EPA) National Pollution Discharge Elimination System (NPDES) permits AK-003865-2 and AK-004064-9.

3. Alaska Department of Environmental Conservation (DEC) Certificates of Reasonable Assurance (401) for the permits named above.

Based on our review, the Division concurs that the proposal is consistent with the Alaska Coastal Management Program provided the following stipulations are added to the NPDES permit AK-004064-9 issued by the EPA:

Page 3 I.B. Effluent Characteristics (outfall 002). Add the following monitoring requirements:

Effluent	Effluent	Limitations	Monitoring	Requirements
Characteristics	Daily Maximum	30 day Average	Frequency	Sample Types
Zinc (mg/l)	1.0	.5	Monthly	Grab
Lead (mg/l)	.6	.3	Monthly	Grab
Mercury (mg/l)	0.002	0.001	Monthly	Grab
Cadmium (mg/l)	0.10	0.05	Monthly	Grab

Page 6, II, Add the Following:

E. Monitoring Program Revisions

1. The type and frequency of sampling may be changed depending on the above effluent and field monitoring program results.

2. EPA may require additional monitoring, including biomonitoring if mercury, lead, zinc, cadmium, or oil and grease concentrations exceed effluent limits.

These stipulations are necessary to insure that the parameters included in the water quality monitoring program at the Port Site include sampling for heavy metals as per 6 AAC 80.140 AIR, LAND, AND WATER QUALITY. The text of this standard is provided as an enclosure to this letter.

The National Park Service Right-of-Way permit to construct the transportation system through the Cape Krusenstern National Monument has also been under consideration during this project consistency review of the Title 11 related approvals. The State continues to support the southern corridor through Cape Krusenstern, and finds the COE permit description of the road grade and fill placement through that corridor acceptable at this time. However, we reserve comment on the final recommended terms and conditions applicable to the National Park Service Right-of-Way permit until such time that the State's Department of Natural Resources, NANA-Cominco, and the National Park Service are prepared to jointly develop and implement terms and conditions which will effectively address the concerns and responsibilities of these land management groups. Our postponement of the final consistency review comments on the Right-of-Way is not intended in any way to hinder progress on the Alaska National Interest Lands Conservation Act, Title 11 permit processing.

By a copy of this letter we are informing the EPA, COE, and the National Park Service of our consistency finding.

Thank you for your cooperation with the Alaska Coastal Management Program.

Sincerely,

Robert L. Grogan

Robert L. Grogan
Associate Director

Enclosure

cc: Esther Wunnicke, Commissioner, DNR, Juneau
Dick Neve', Commissioner, DEC, Juneau
Don Collinsworth, Commissioner, DFG, Juneau
Jerry Brossia, District Manager, DNR, Juneau
Douglas Lowery, Regional Supervisor, DEC, Juneau
Al Ott, Regional Supervisor, DFG, Juneau
Fred Wemark, NANA CRSA, Kotzebue
Bill Riley, EPA, Seattle
Joe Williamson, COE, Anchorage
Floyd Sharrock, NPS, Anchorage

STATE OF ALASKA

DIVISION OF GOVERNMENTAL COORDINATION

STANDARDS OF THE

ALASKA COASTAL MANAGEMENT PROGRAM

Standard(s): 6 AAC 80.140. AIR, LAND, AND WATER QUALITY. Notwithstanding any other provision of this chapter, the statutes pertaining to and the regulations and procedures of the Alaska Department of Environmental Conservation with respect to the protection of air, land, and water quality are incorporated into the Alaska coastal management program and, as administered by that agency, constitute the components of the coastal management program with respect to those purposes.

Authority: AS 44.19.893
AS 46.40.040